Honeywell

Honeywell VFD CORE User and Application Manual

INSTALLATION INSTRUCTIONS

CONTENTS

63-4528-06

CHAPTER 1: INTRODUCTION

Receiving and Inspection

After receiving the VFD, please check for the following:

1. Please inspect the unit after unpacking to assure it was not damaged during shipment.
2. Make sure that the part number printed on the package corresponds with the part number indicated on the nameplate
3. Make sure that the voltage for the wiring lie within the range as indicated on the nameplate.
4. Please install the VFD according to this manual.
5. Before applying the power, please make sure that all the devices, including power, motor, control board and digital keypad, are connected correctly.
6. When wiring the VFD, please make sure that the wiring of input terminals “R/L1, S/L2, T/L3” and output terminals “U/T1, F/T2, W/T3” are correct to prevent drive damage.
7. When power is applied, select the language and set the parameter groups via the digital keypad.
8. After applying the power, please trial run with the low speed and then increase the speed gradually to the desired speed.

Nameplate Information

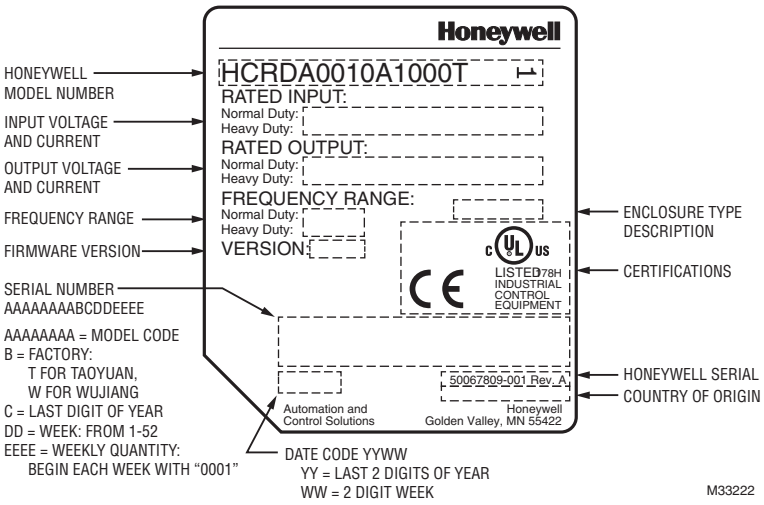


Fig. 1. Nameplate Information.

Model Name

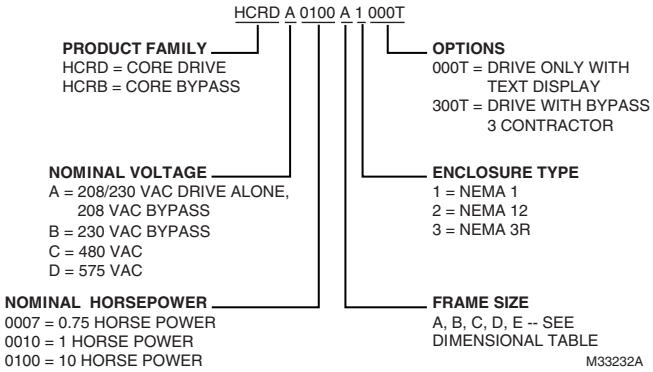


Fig. 2. Model Name.

Product Serial Number

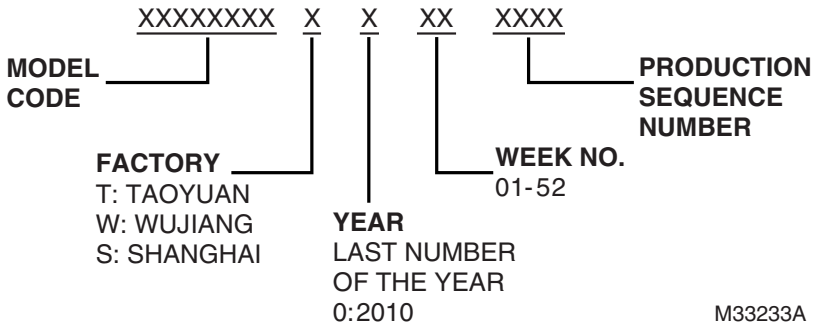


Fig. 3. Product Serial Number.

Table 1. Dimensions for Frames A, B, C in mm [inch].

208/230Vac	460Vac	HP	Weight (kg.)	Frame	W	H	D	W1	H1	D1*	S1	ϕ1	ϕ2	ϕ3
HCRDA0010A1000T	HCRDC0010A1000T	1	2.8	A	130 [5.12]	250 [9.84]	170 [6.69]	116 [4.57]	236 [9.29]	45.8 [1.80]	6.2 [.24]	22.2 [.87]	34 [1.34]	28 [1.1]
HCRDA0020A1000T	HCRDC0020A1000T	2	2.8											
HCRDA0030A1000T	HCRDC0030A1000T	3	2.8											
HCRDA0050A1000T	HCRDC0050A1000T	5	2.8											
HCRDA0075A1000T	HCRDC0075A1000T	7.5	2.8											
	HCRDA0100A1000T	10	2.8											
HCRDA0100B1000T		10	4.6	B	190 [7.48]	320 [12.60]	190 [7.48]	173 [6.81]	303 [11.93]	77.9 [3.07]	8.5 [0.33]	22.2 [0.87]	34 [1.34]	43.8 [1.72]
HCRDA0150B1000T	HCRDC0150B1000T	15	4.6											
HCRDA0200B1000T	HCRDC0200B1000T	20	5.6											
	HCRDC0250B1000T	25												
HCRDA0250C1000T		25	10.5	C	250 [9.84]	400 [15.75]	210 [8.27]	231 [9.09]	381 [15.00]	92.9 [3.66]	8.5 [0.33]	22.2 [0.87]	34 [1.34]	50 [1.97]
HCRDA0300C1000T	HCRDC0300C1000T	30	10.5/8.7											
HCRDA0400C1000T	HCRDC0400C1000T	40	10.5/8.7											
	HCRDC0500C1000T	50	9.4											

D1*: Flange mounting Unit: mm [inch]

FRAME A

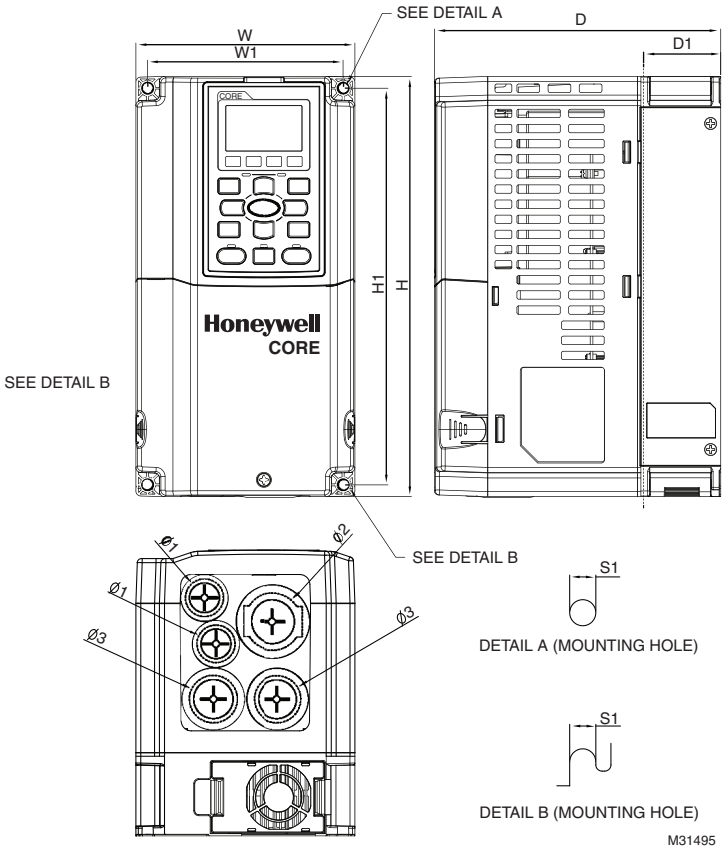


Fig. 4. Frame A: Units in mm (inches). See also Table 1.

FRAME B

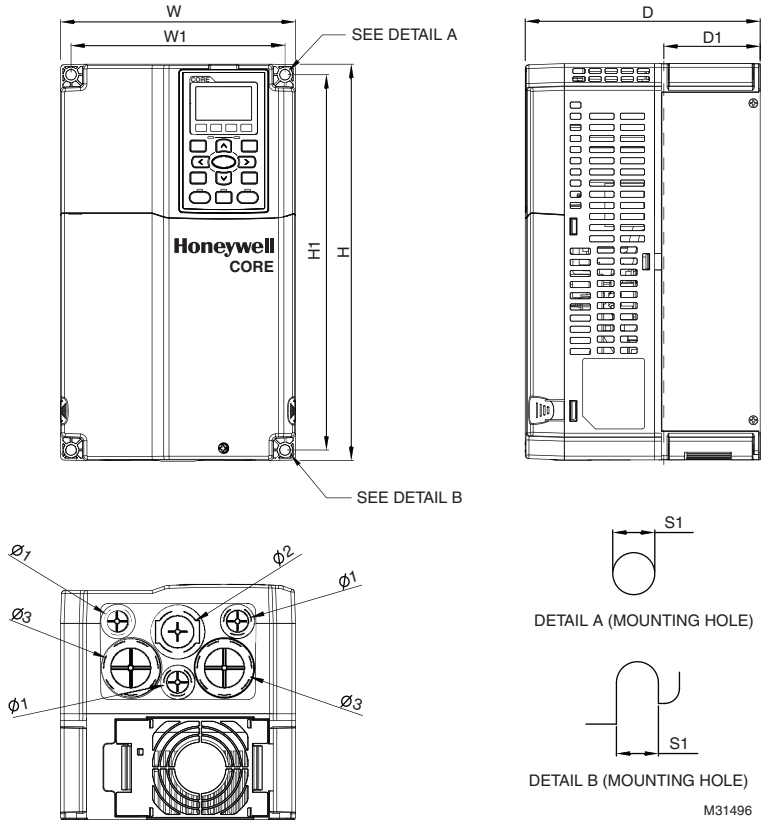


Fig. 5. Frame B: Units in mm (inches). See also Table 1.

FRAME C

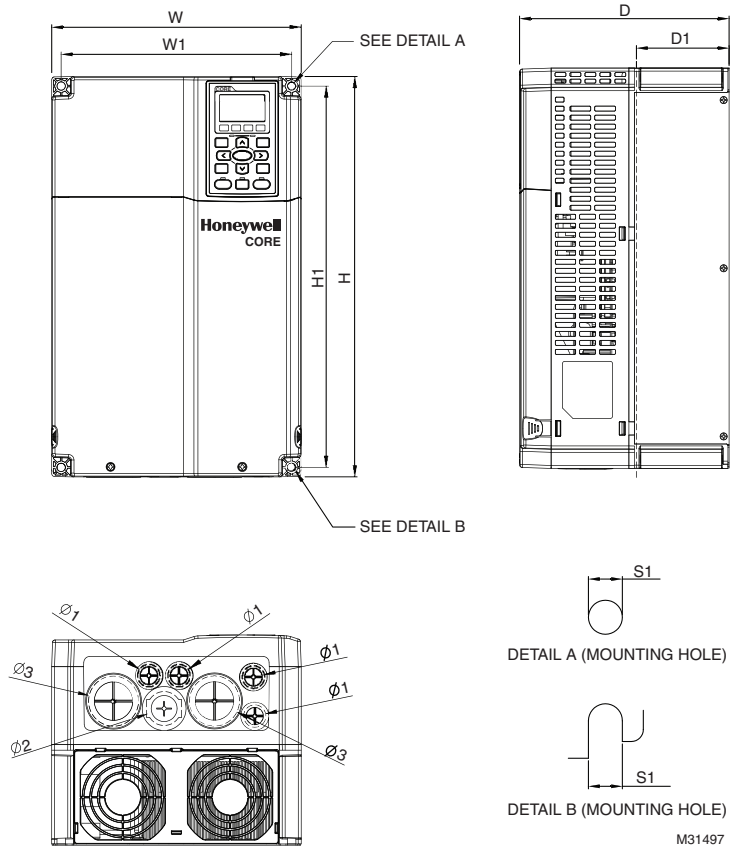


Fig. 6. Frame C: Units in mm (inches). See also Table 1.

Table 2. Dimensions for Frames D and E in mm [inches].

208/230Vac	460Vac	HP	Weight (Kg.)	Frame	W	H	D	W1	H1	H2	H3	D1*	D2	S1	S2	ϕ1	ϕ2	ϕ3
HCRDA0500D1000T		50	35.5	D	330	688.3	275	285	550	525	492	107.2	16	11	18	76.2	34	22
HCRDA0600D1000T	HCRDC0600D1000T	60	35.5		[12.99]	[27.10]	[10.83]	[11.22]	[21.65]	[20.67]	[19.37]	[4.22]	[0.63]	[0.43]	[0.71]	[3.00]	[1.34]	[0.87]
	HCRDC0750D1000T	75	35.5															
	HCRDC1000D1000T	100	35.5/ 40.5															
	HCRDC1250D1000T	125	35.5/ 40.5															
HCRDA0750E1000T		75	45.7	E	370	715.8	300	335	589	560	528	143	18	13	18	22	34	92
HCRDA1000E1000T		100	46.2		[14.57]	[28.18]	[11.81]	[13.19	[23.19]	[22.05]	[20.80]	[5.63]	[0.71]	[0.51]	[0.71]	[0.87]	[1.34]	[3.62]
HCRDA1250E1000T		125	54.7															

*D1 Flange mounting

FRAME D

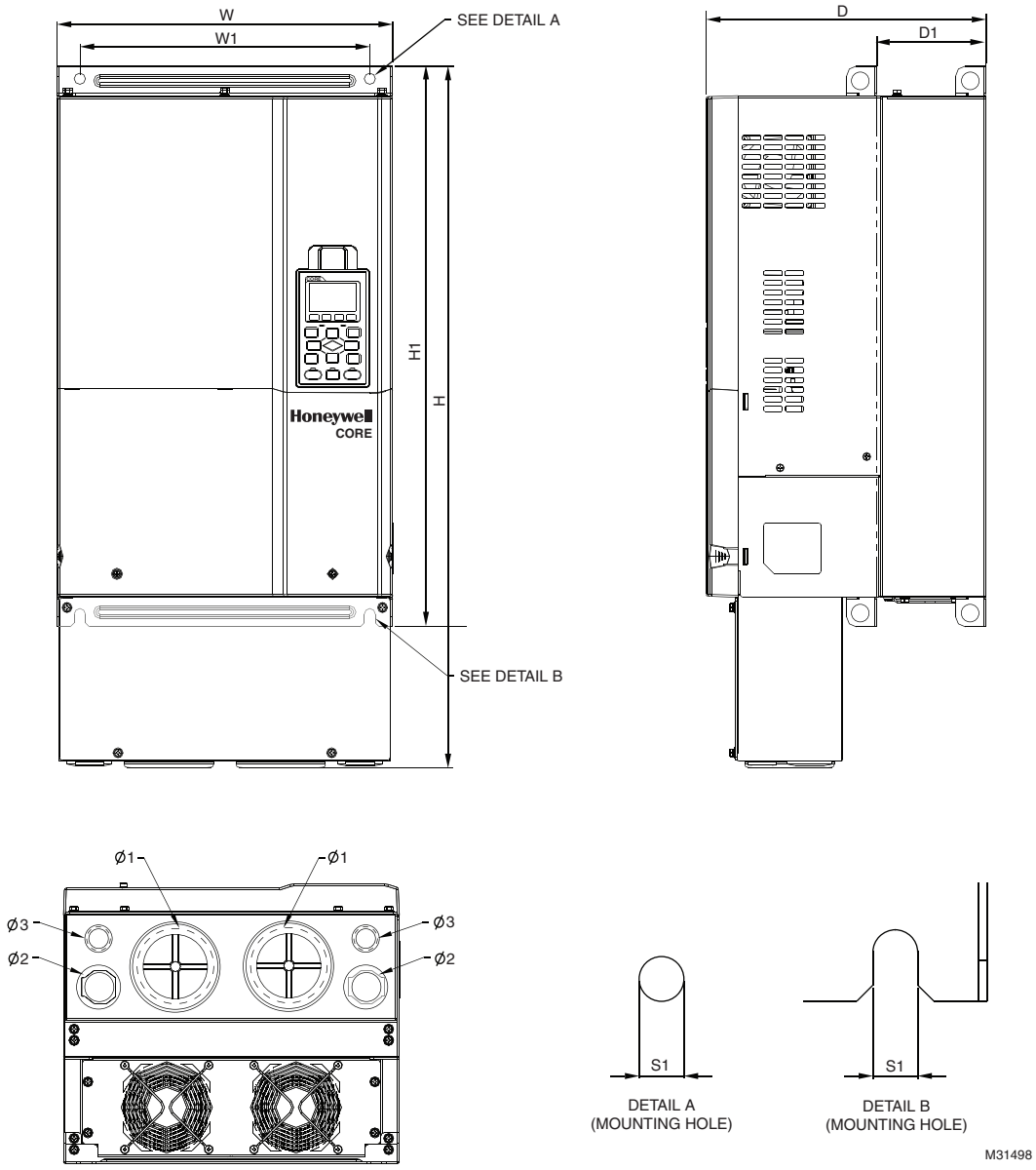


Fig. 7. Frame D: Units in mm (inches). See also Table 2.

FRAME E

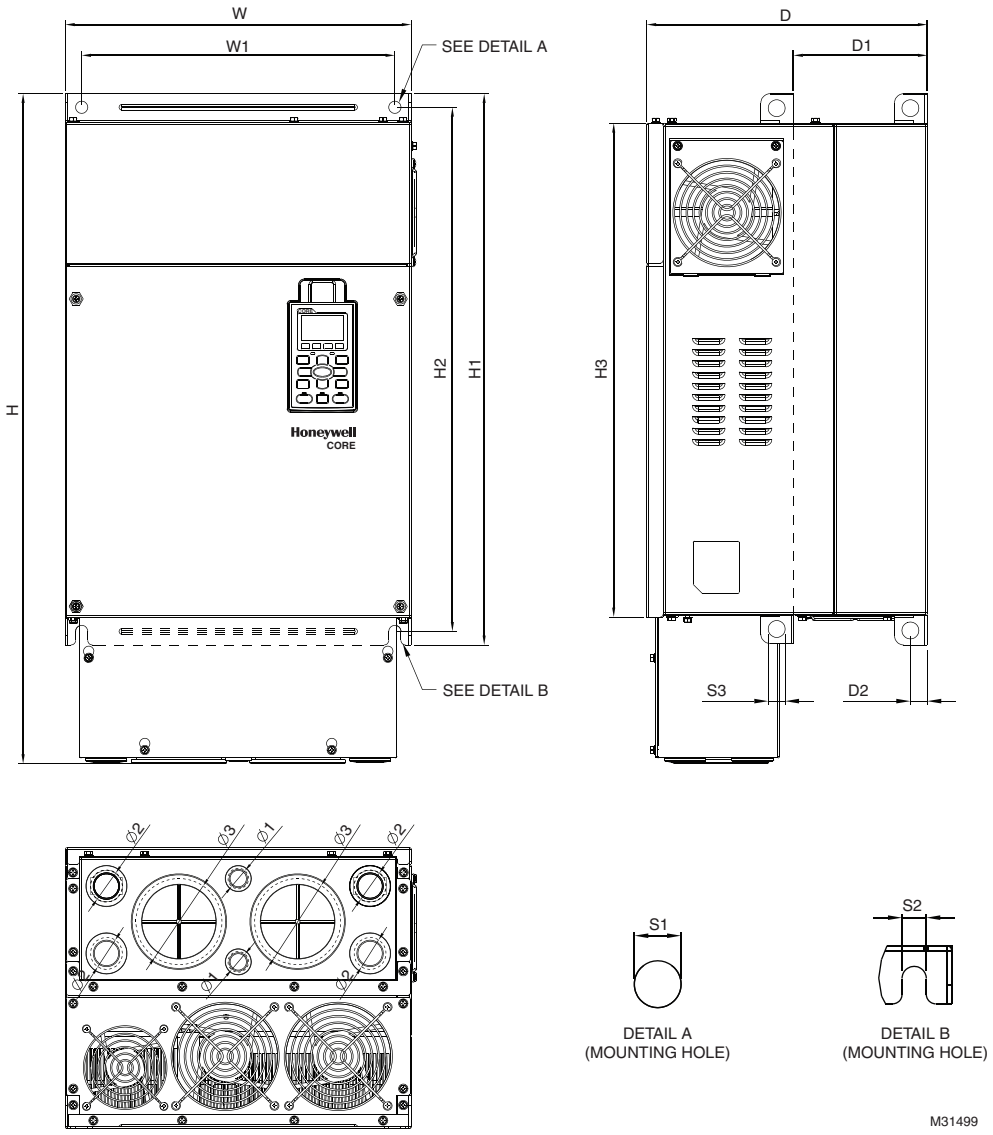


Fig. 8. Frame E: Units in mm (inches). See also Table 2.

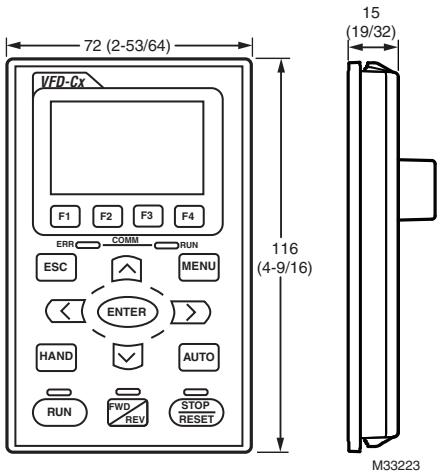
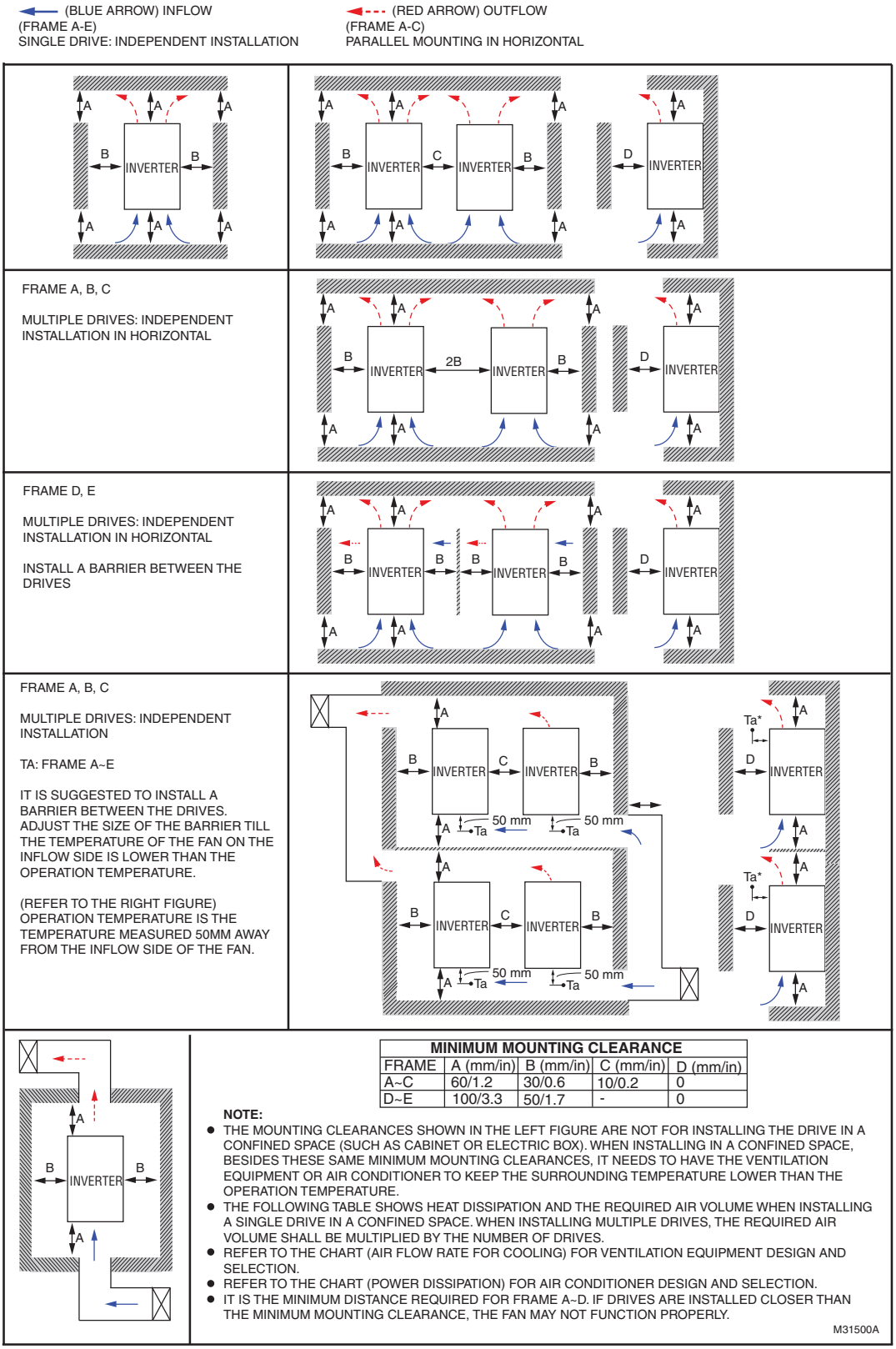


Fig. 9. Keypad Dimensions in mm (inches).

CHAPTER 2: INSTALLATION

The appearances shown in the following figures are for reference only.



MINIMUM MOUNTING CLEARANCE				
FRAME	A (mm/in)	B (mm/in)	C (mm/in)	D (mm/in)
A~C	60/1.2	30/0.6	10/0.2	0
D~E	100/3.3	50/1.7	-	0

NOTE:

- THE MOUNTING CLEARANCES SHOWN IN THE LEFT FIGURE ARE NOT FOR INSTALLING THE DRIVE IN A CONFINED SPACE (SUCH AS CABINET OR ELECTRIC BOX). WHEN INSTALLING IN A CONFINED SPACE, BESIDES THESE SAME MINIMUM MOUNTING CLEARANCES, IT NEEDS TO HAVE THE VENTILATION EQUIPMENT OR AIR CONDITIONER TO KEEP THE SURROUNDING TEMPERATURE LOWER THAN THE OPERATION TEMPERATURE.
- THE FOLLOWING TABLE SHOWS HEAT DISSIPATION AND THE REQUIRED AIR VOLUME WHEN INSTALLING A SINGLE DRIVE IN A CONFINED SPACE. WHEN INSTALLING MULTIPLE DRIVES, THE REQUIRED AIR VOLUME SHALL BE MULTIPLIED BY THE NUMBER OF DRIVES.
- REFER TO THE CHART (AIR FLOW RATE FOR COOLING) FOR VENTILATION EQUIPMENT DESIGN AND SELECTION.
- REFER TO THE CHART (POWER DISSIPATION) FOR AIR CONDITIONER DESIGN AND SELECTION.
- IT IS THE MINIMUM DISTANCE REQUIRED FOR FRAME A~D. IF DRIVES ARE INSTALLED CLOSER THAN THE MINIMUM MOUNTING CLEARANCE, THE FAN MAY NOT FUNCTION PROPERLY.

Fig. 1. Minimum Mounting Clearances

Table 1. Voltage & Model Numbers for Frames

Frame	Voltage & Model
A	208/230Vac HCRDA0010A1000T, HCRDA0020A1000T, HCRDA0030A1000T, HCRDA0050A1000T, HCRDA0075A1000T 460Vac HCRDC0010A1000T, HCRDC0020A1000T, HCRDC0030A1000T, HCRDC0050A1000T, HCRDC0075A1000T, HCRDC0100A1000T
B	208/230 Vac HCRDA0100B1000T, HCRDA0150B1000T, HCRDA0200B1000T 460 vac HCRDC0150B1000T, HCRDC0200B1000T, HCRDC0250B1000T
C	208/230 Vac HCRDA0250C1000T, HCRDA0300C1000T, HCRDA0400C1000T 460 Vac HCRDC0300C1000T, HCRDC0400C1000T, HCRDC0500C1000T
D	208/230 Vac HCRDA0500D1000T, HCRDA0600D1000T 460 Vac HCRDC0600D1000T, HCRDC0750D1000T, HCRDC1000D1000T, HCRDC1250D1000T
E	208/ 230 Vac HCRDA0750E1000T, HCRDA1000E1000T, HCRDA1250E1000T

Table 2. Maximum Motor Cable Lengths.

For Models 7.5HP/5.5kW and above:			
Insulation Level of Motor	1000V	1300V	1600V
460 VAC Input Voltage	66 ft	328 ft	1312 ft
230 VAC Input Voltage	1312 ft	1312 ft	1312 ft
For Models 5HP/3.7kW and below:			
Insulation Level of Motor	1000V	1300V	1600V
460 VAC Input Voltage	66 ft	165 ft	165 ft
230 VAC Input Voltage	328 ft	328 ft	328 ft

Table 3. Air Flow Requirements.

Air flow rate for cooling								Power Dissipation		
		Flow Rate (cfm)			Flow Rate (m^3/hr)			Power Dissipation (Watts)		
Model 230Vac	Frame Size	External	Internal	Total	External	Internal	Total	Loss External (Heat sink)	Internal	Total
HCRDA0010A1000T	A	-	-	-	-	-	-	40	31	71
HCRDA0020A1000T	A	-	-	-	-	-	-	61	39	100
HCRDA0030A1000T	A	14	-	14	24	-	24	81	45	126
HCRDA0050A1000T	A	14	-	14	24	-	24	127	57	184
HCRDA0075A1000T	A	10	-	10	17	-	17	158	93	251
HCRDA0100B1000T	B	40	14	54	68	24	92	291	101	392
HCRDA0150B1000T	B	66	14	80	112	24	136	403	162	565
HCRDA0200B1000T	B	58	14	73	99	24	124	570	157	727
HCRDA0250C1000T	C	166	12	178	282	20	302	622	218	840
HCRDA0300C1000T	C	166	12	178	282	20	302	777	197	974
HCRDA0400C1000T	C	146	12	158	248	20	268	878	222	1100
HCRDA0500D1000T	D	179	30	209	304	51	355	1271	311	1582
HCRDA0600D1000T	D	179	30	209	304	51	355	1550	355	1885
HCRDA0750E1000T	E	228	73	301	387	124	511	1762	489	2251
HCRDA1000E1000T	E	228	73	301	387	124	511	2020	574	2594
HCRDA1250E1000T	E	246	73	319	418	124	542	2242	584	3026
Model 460Vac										
HCRDC0010A1000T	A	-	-	-	-	-	-	35	32	67
HCRDC0020A1000T	A	-	-	-	-	-	-	44	31	75
HCRDC0030A1000T	A	-	-	-	-	-	-	58	43	101
HCRDC0050A1000T	A	14	-	14	24	-	24	92	60	152
HCRDC0075A1000T	A	10	-	10	17	-	17	135	99	234
HCRDC0100A1000T	A	10	-	10	17	-	17	165	164	439
HCRDC0150B1000T	B	40	14	54	68	24	92	275	93	380
HCRDC0200B1000T	B	66	14	80	112	24	136	370	194	564
HCRDC0250B1000T	B	58	14	73	99	24	124	370	194	564
HCRDC0300C1000T	C	99	21	120	168	36	204	455	358	813
HCRDC0400C1000T	C	99	21	120	168	36	204	609	363	972
HCRDC0500C1000T	C	126	21	147	214	36	250	845	405	1250
HCRDC0600D1000T	D	179	30	209	304	51	355	1056	459	1515
HCRDC0750D1000T	D	179	30	209	304	51	355	1163	669	1832
HCRDC1000D1000T	D	179	30	209	304	51	355	1639	657	2296
HCRDC1250D1000T	D	186	30	216	316	51	367	1787	955	2742

The required airflow shown in chart is for installing single drive in a confined space.

When installing the multiple drives, the required air volume should be the required air volume for single drive multiplied by the number of the drives.

Heat dissipation for each model is calculated by rated voltage, current and default carrier at full load, full speed, and maximum ambient temperature

CHAPTER 3: UNPACKING

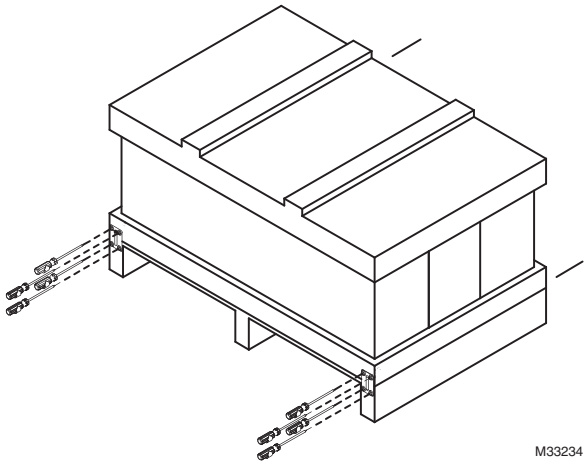
The VFD should be kept in the shipping carton or crate before installation. In order to retain the warranty coverage, the VFD should be stored properly when it is not to be used for an extended period of time.

The frame size D and size E VFDs are packed in crates. Follow the instructions below for unpacking.

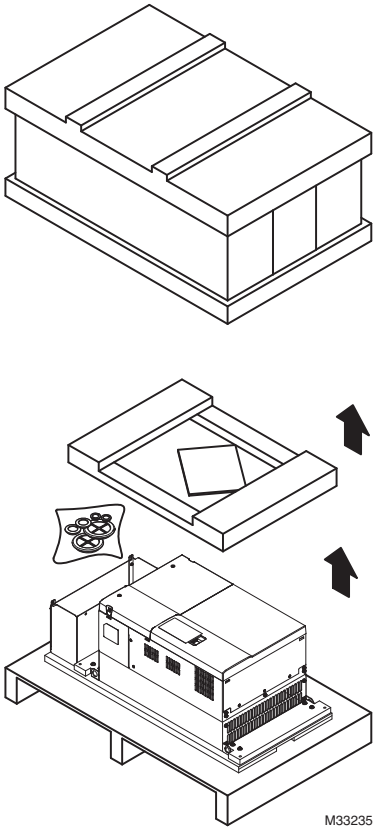
Frame D

Crate (HCRDXXXXXD1000T)

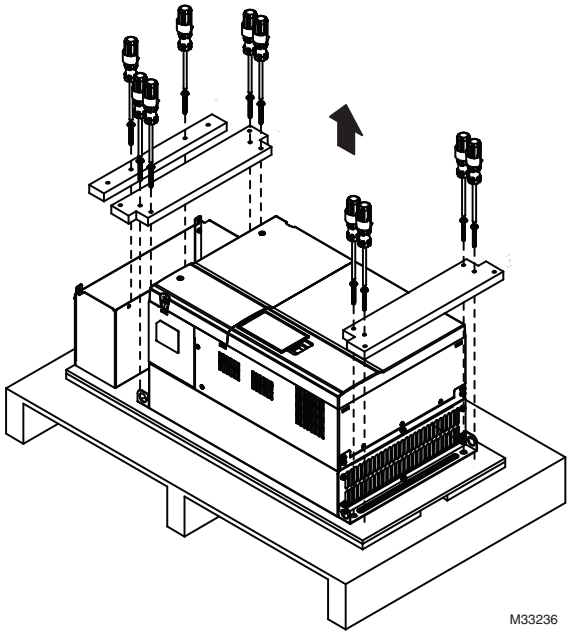
1. Loosen all the screws on the four iron plates at the four bottom corners of the crate. Four screws are on each of the iron plates.



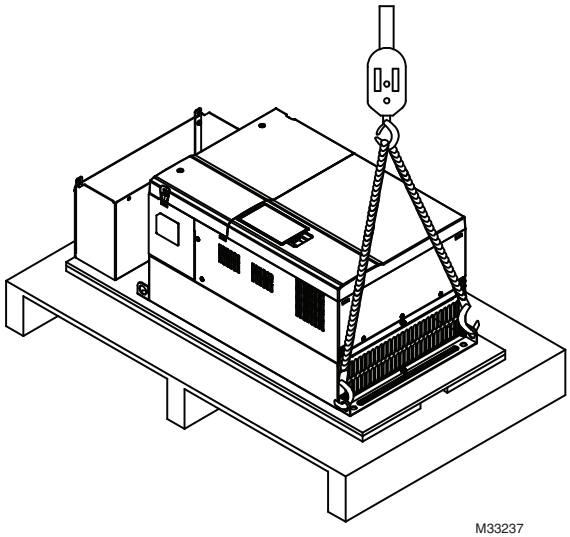
2. Remove the crate cover, EPEs, rubber and manual.



3. Loosen the 10 screws on the pallet, then remove the wooden plate.

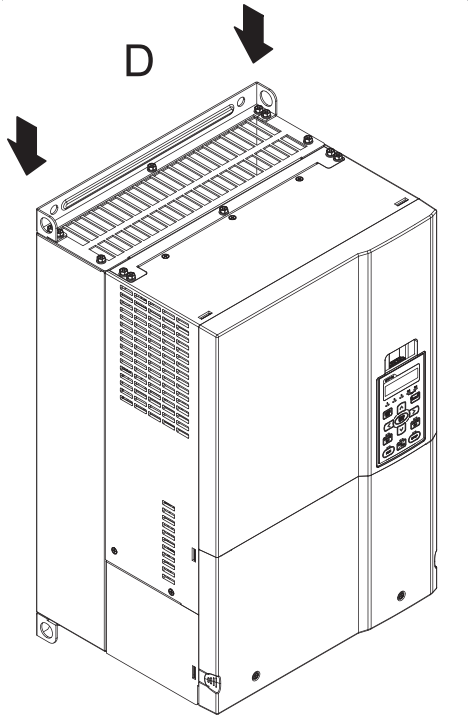


4. Lift the drive by hooking the lifting holes. It is now ready for installation.

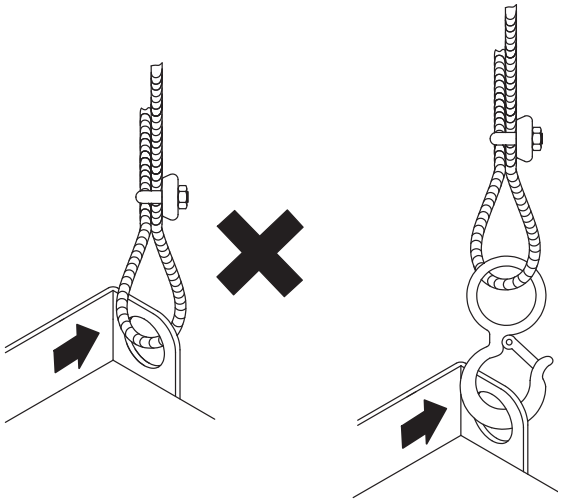


Using the lifting hook

1. The arrows show the position of lifting holes.



2. Make sure the lifting hook properly goes through the lifting hole, as shown on the far right below.



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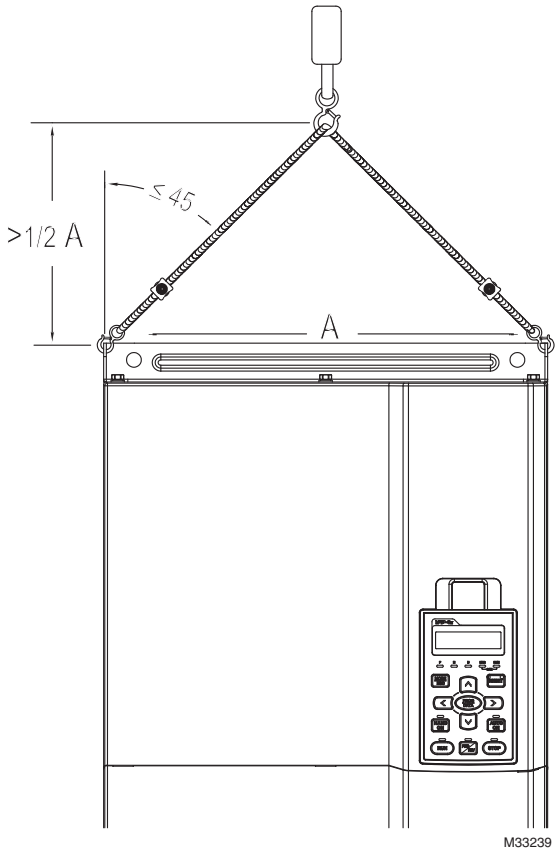
3. Ensure that the angle between the lifting holes and lifting device is within the specification as shown below.



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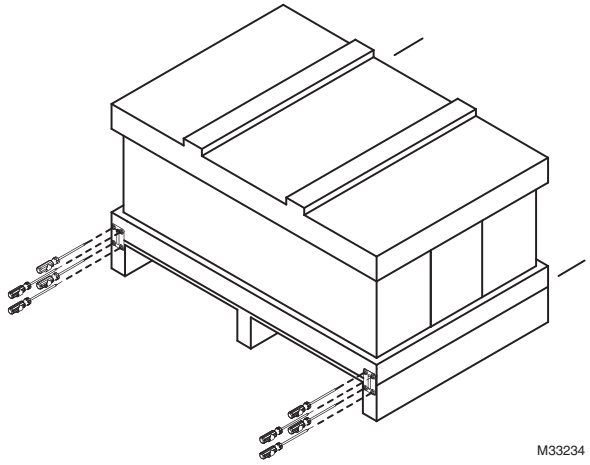
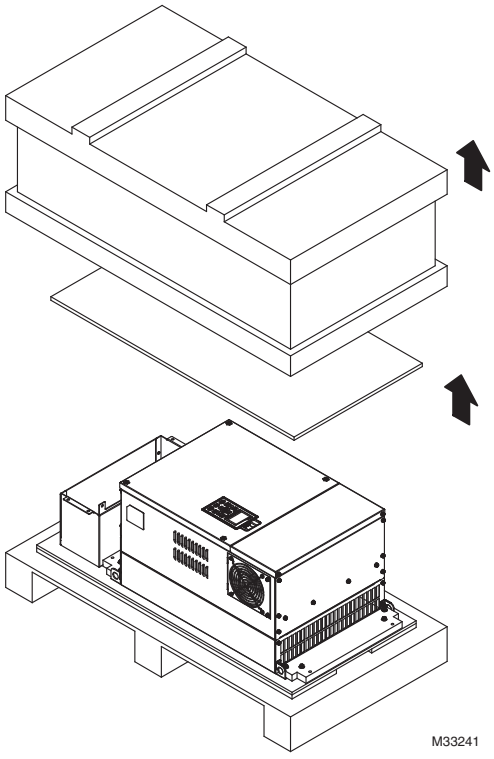
Frame E

Crate (HCRDXXXXXD1000T)

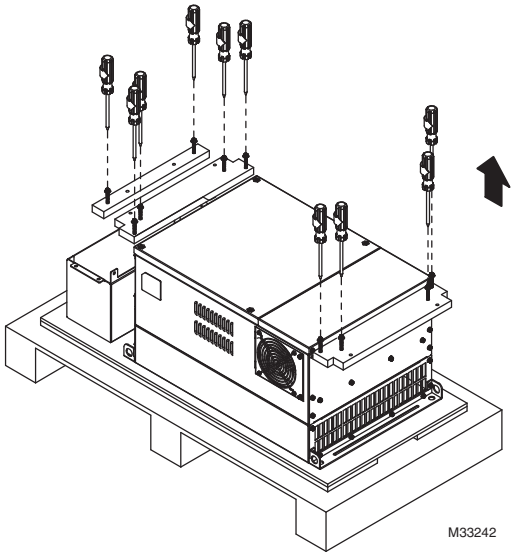
1. Loosen all the screws on the four iron plates at the four bottom corners of the crate. Four screws are on each of the iron plates.



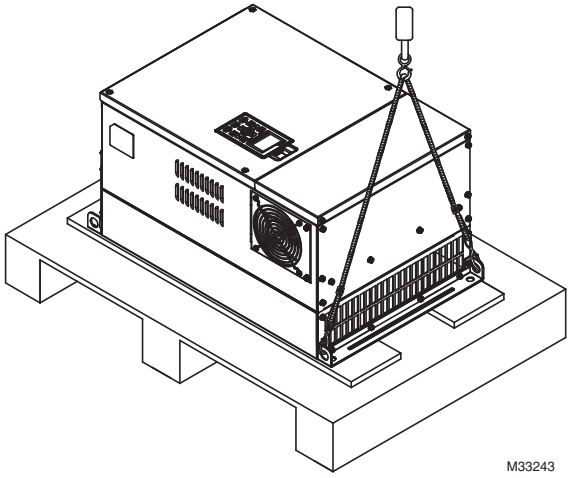
2. Remove the crate cover, EPEs, rubber and manual.



3. Loosen the 10 screws on the pallet, then remove the wooden plate.

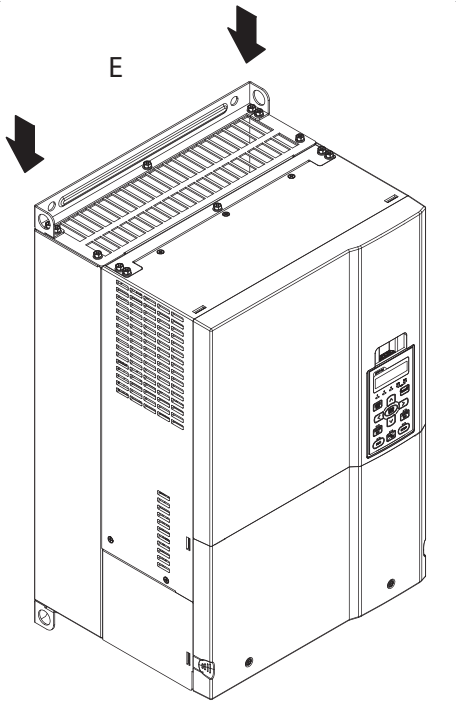


4. Lift the drive by hooking the lifting holes. It is now ready for installation.

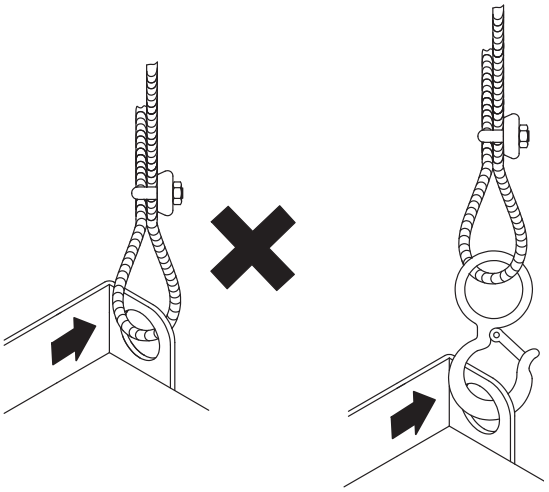


Using the lifting hook

1. The arrows show the position of lifting holes.



2. Make sure the lifting hook properly goes through the lifting hole, as shown on the far right below.



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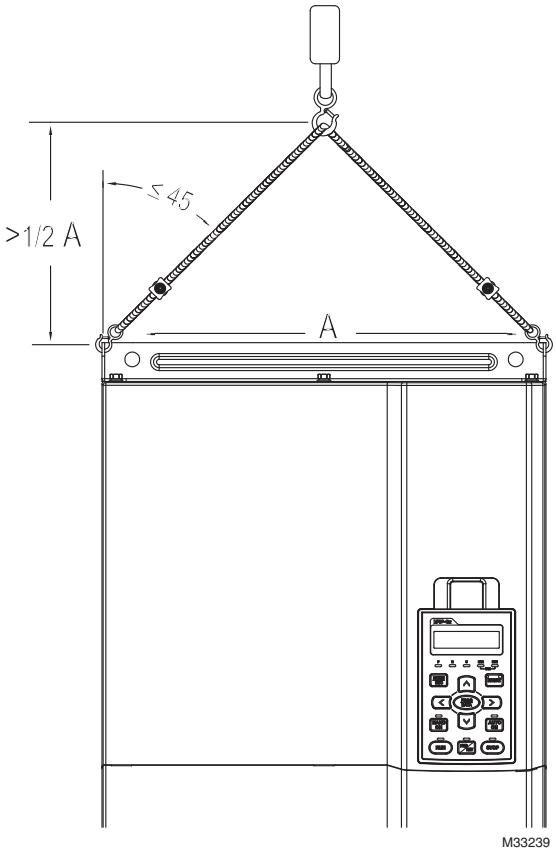
3. Ensure that the angle between the lifting hole and lifting device is within the specification as shown below.



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CHAPTER 4: WIRING

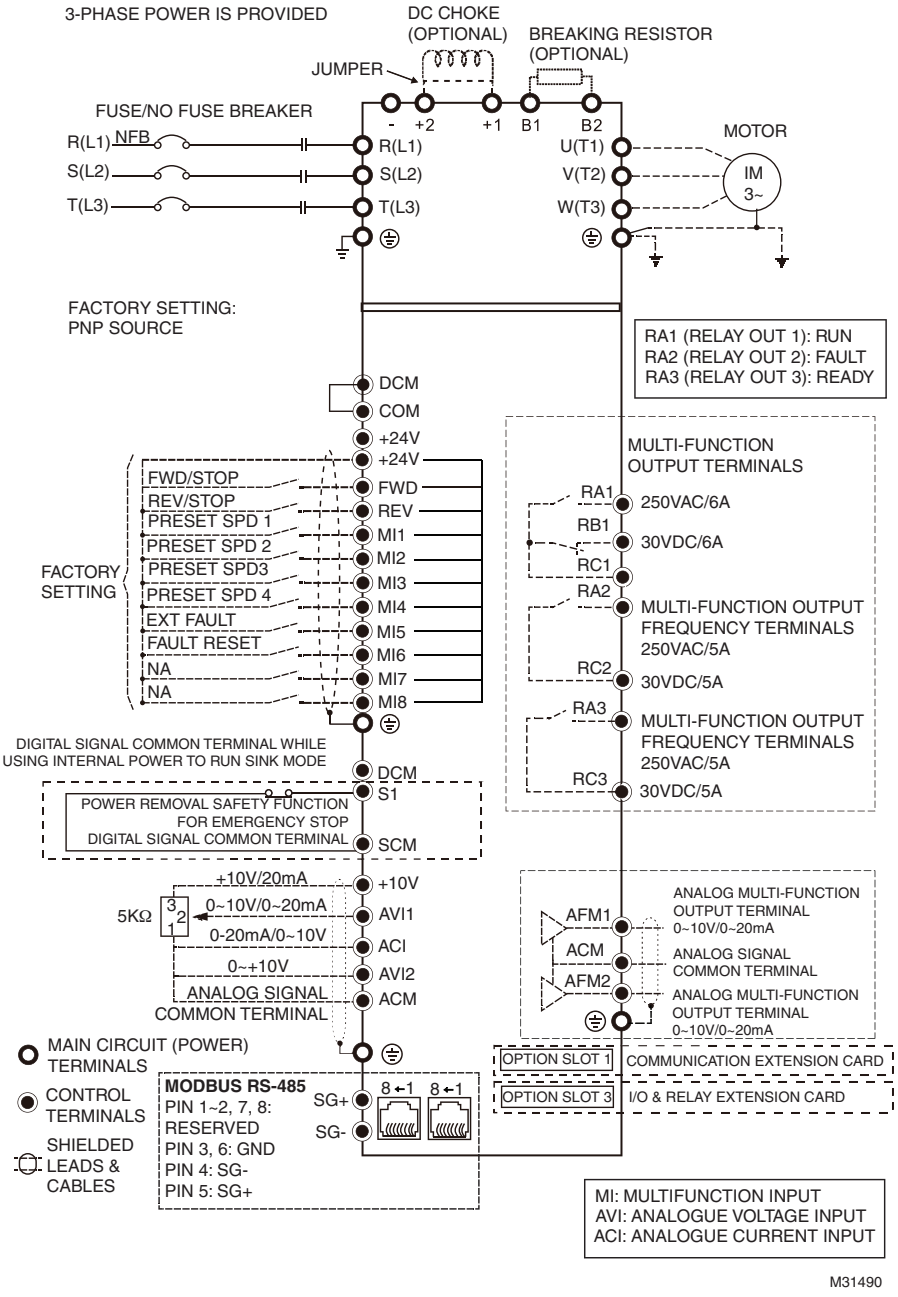


Fig. 1. Wiring Diagram for Frames A-C.

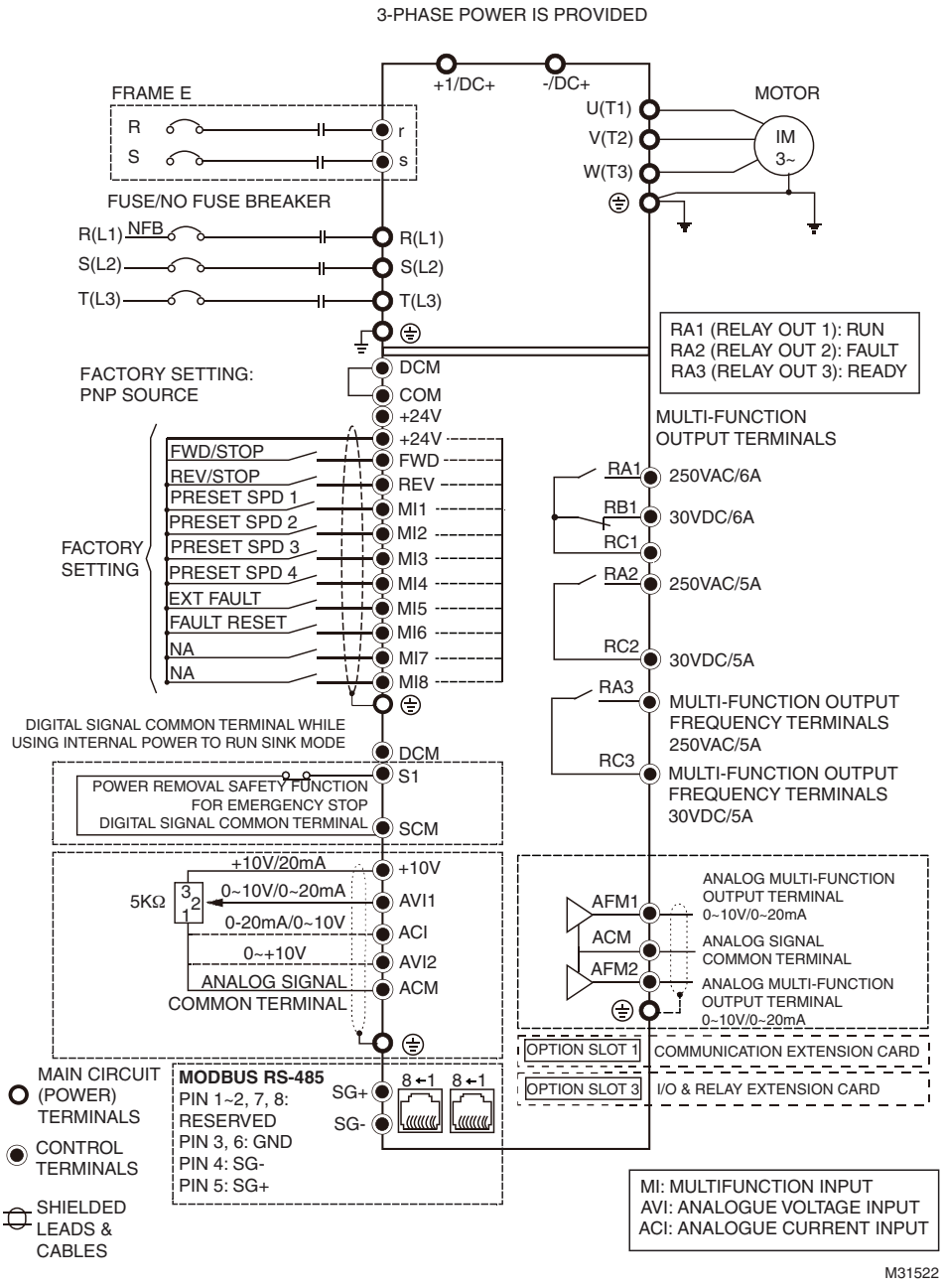


Fig. 2. Wiring Diagram for Frames D and E.

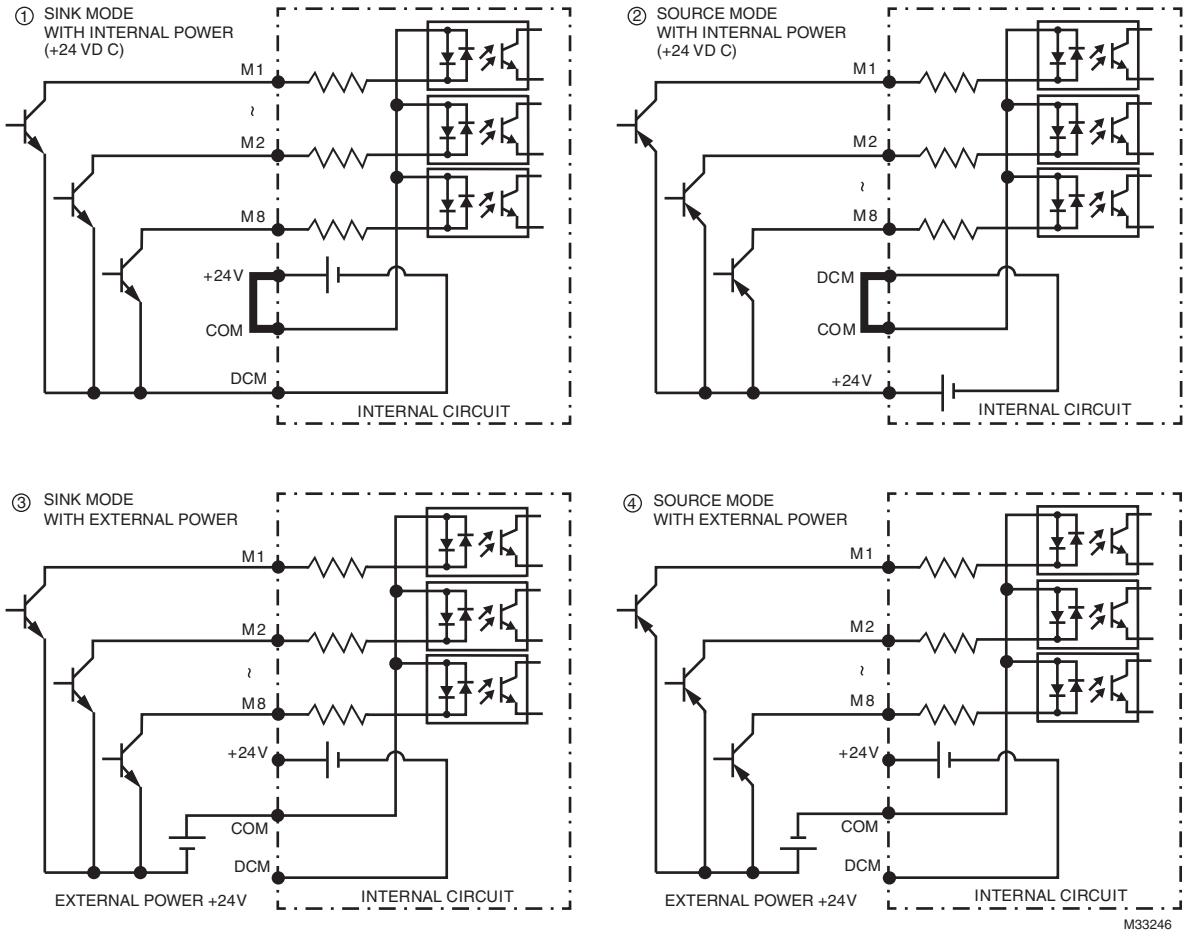


Fig. 3. Sink (NPN)/Source (PNP) Mode.
Option number 2 Source Mode is most frequently used for Honeywell VFDs.

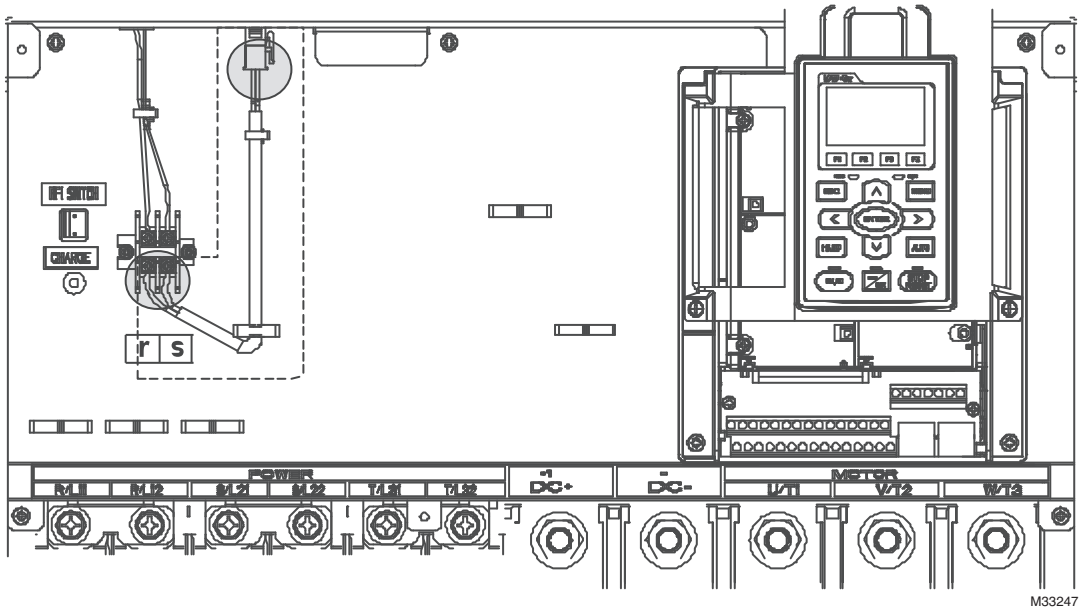


Fig. 4. Frame E, remove terminal r and terminal s before using DC-Link.
(As circled in dotted line, uninstall the gray section and properly store cable r and cable s. Cable r and cable s are not available in optional accessories; do not throw them away.)

CHAPTER 5: MAIN CIRCUIT TERMINAL

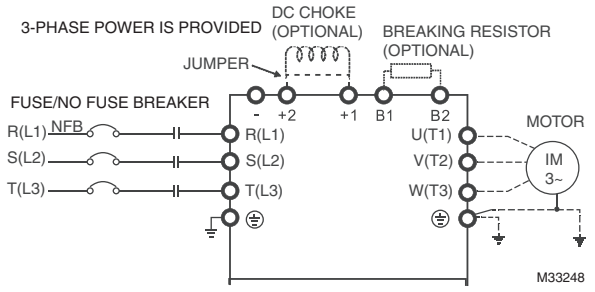


Fig. 1. Main Circuit Terminal of Frame A~C.

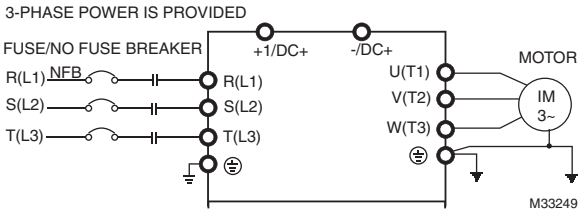


Fig. 2. Main Circuit Terminal of Frame D.

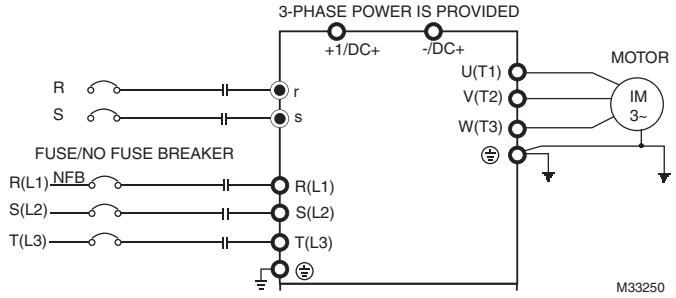
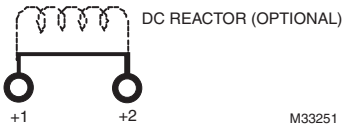
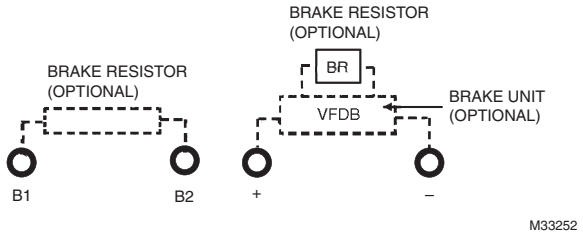


Fig. 3. Main Circuit Terminal of Frame E.

Table 1. Control Connections

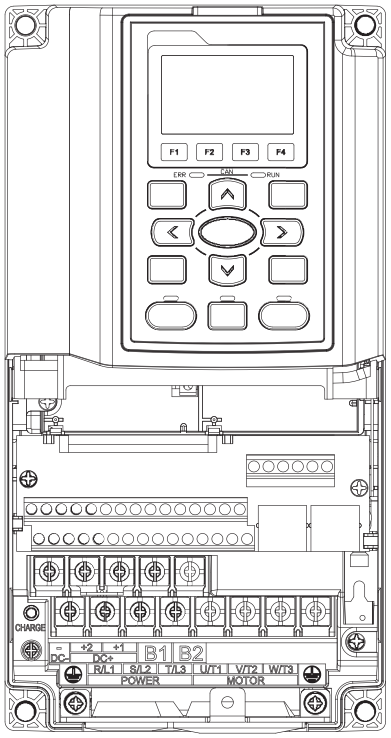
Terminals	Descriptions
R/L1, S/L2, T/L3	AC line input terminals 3-phase
U/T1, V/T2, W/T3	VFD output terminals for connecting 3-phase induction motor
+1, +2	Applicable to frame A~C Connections for DC reactor to improve the power factor. One needs to remove the jumper for installation.
+1/DC+, -/DC-	Applicable to frame D~E Connections for brake unit (for 230V models: 22kW, built-in brake unit) (for 460V models: 30kW, built-in brake unit) Common DC Bus When connecting DC+ and DC-, please follow the required wired gauge in Honeywell VFD CORE user manual.

Table 1. Control Connections

B1, B2	Connections for brake resistor (optional)
⏚	Grounding connection, please comply with local regulations.
CAUTION	**Main power terminals** • Do not connect 3-phase model to one-phase power. It is unnecessary to consider phase-sequence for these terminals R/L1, S/L2 and T/L3. • It is recommended to add a magnetic contactor (MC) in the power input wiring to cut off power quickly and reduce malfunction when activating the protection function of the VFD. Both ends of the MC should have an R-C surge absorber. • Securely fasten the main circuit terminals to prevent sparks which can be made by the loose screws due to vibration. • Use voltage and current within the specification. • When using a general GFCI (Ground Fault Circuit Interrupter), select a current sensor with sensitivity of 200mA or above and not less than 0.1-second operation time to avoid nuisance tripping. • Use shield wire or tube for the power wiring and ground the two ends of the shield wire or tube. • Do NOT stop the VFD by cutting the power. Stop the VFD using RUN/STOP command via control terminals or keypad. If you must stop the VFD by turning the power OFF. Do not do so more than once per hour. • For more information on field supplied fuse or non-fuse circuit breaker please see chapter 7. **Output terminals for main circuit** • When installing a load filter at the output side of terminals U/T1, V/T2, W/T3 of the VFD, please use inductance filter. Do not use phase-compensation capacitors or L-C (Inductance-Capacitance) or R-C (Resistance-Capacitance), unless approved by Honeywell. • DO NOT connect phase-compensation capacitors or surge absorbers at the output terminals of the VFD. • Recommended using an inverter duty-rated motor. **Terminals for connecting DC reactor, external brake resistor, external brake resistor and DC circuit** • These are the terminals used to connect the DC reactor to improve the power factor. The drive is shipped with a jumper across these terminals. Please remove this jumper before connecting to the DC reactor. Note that these devices are available from third-party suppliers.  • Brake resistors are usually not needed in HVAC applications. However, in applications with frequent deceleration ramps, short deceleration times, and insufficient brake torque, such as those with high inertia, a brake resistor may be necessary. For information on brake resistor specifications, please contact technical support at 888-516-9347.  • The external brake resistor should connect to the terminals (B1, B2) of the VFD. • For those models without built-in brake resistor, connect external brake unit and brake resistor (both of them are optional) to increase brake torque. • When the terminals +1, +2 and - are not used, leave the terminals open. • DO NOT connect [+1, -], [+2, -], [+1/DC+, -/DC-] or brake resistor directly to prevent drive damage.

Specifications of the Main Circuit Terminals

FRAME A



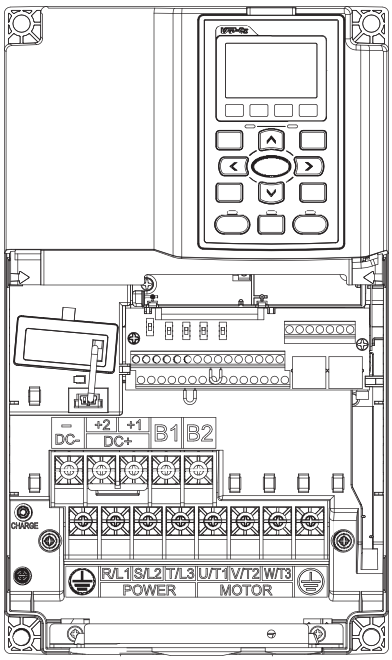
M33253

Main Circuit Terminals:
R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, ⏚ , B1, B2, +1, +2, -

Model	Max. Wire Gauge	Min. Wire Gauge	Torque (±10%)
HCRDA0010A1000T	8 AWG (8.4mm^2)	14 AWG (2.1mm^2)	M4 20kg-cm (17.4 lb-in.) (1.962Nm)
HCRDA0020A1000T		14 AWG (2.1mm^2)	
HCRDA0030A1000T		12 AWG (3.3mm^2)	
HCRDA0050A1000T		10 AWG (5.3mm^2)	
HCRDA0075A1000T		10 AWG (5.3mm^2)	
HCRDC0010A1000T		14 AWG (2.1mm^2)	
HCRDC0020A1000T		14 AWG (2.1mm^2)	
HCRDC0030A1000T		14 AWG (2.1mm^2)	
HCRDC0050A1000T		14 AWG (2.1mm^2)	
HCRDC0075A1000T		10 AWG (5.3mm^2)	
HCRDC0100A1000T		10 AWG (5.3mm^2)	

NOTE: UL installations must use 600V, 75°C or 90°C wire. Use copper wire only.

FRAME B



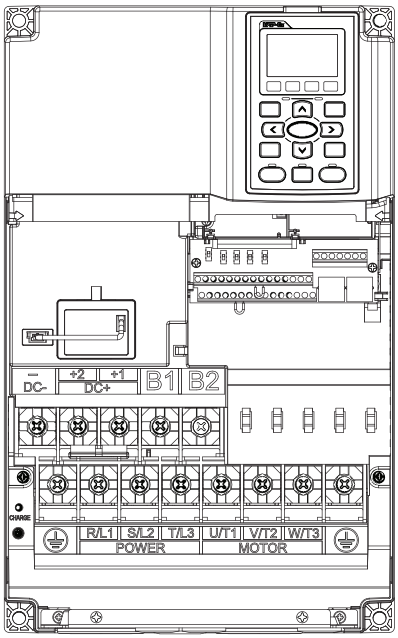
M33254

Main Circuit Terminals:
R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, , B1, B2, +1, +2, -

Model	Max. Wi ⏚ Gauge	Min. Wire Gauge	Torque (±10%)
HCRDA0100B1000T	4 AWG (21.2mm^2)	8 AWG (8.4mm^2)	M5 35kg-cm (30.4 lb-in.) (3.4335Nm)
HCRDA0150B1000T		4 AWG (21.2mm^2)	
HCRDA0200B1000T		4 AWG (21.2mm^2)	
HCRDC0150B1000T		8 AWG (8.4mm^2)	
HCRDC0200B1000T		8 AWG (8.4mm^2)	
HCRDC0250B1000T		6 AWG (13.3mm^2)	

NOTE: UL installations must use 600V, 75°C or 90°C wire. Use copper wire only.
M5 35kg-cm (30.4 lb-in.) (3.4335Nm) Torque 45 Kg-cm [39.0 lb-in.] (4.415Nm) (±10%)
Terminal D+ [+2 & +1]: Torque: 45 kg-cm [39.0lb-in.] (4.415Nm) (±10%)
HCRDA0200B1000T must use 600V, 90°C wire when surrounding temperature exceeds 45°C.

FRAME C



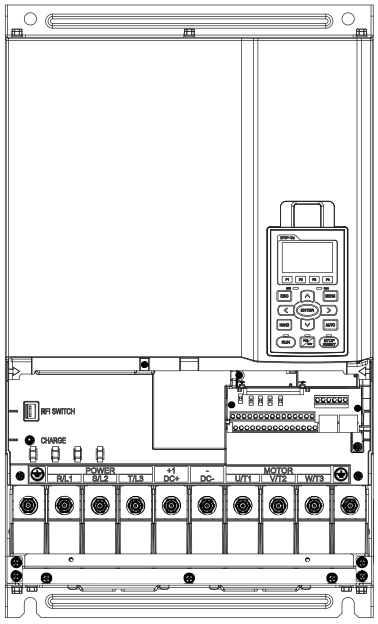
M33255

Main Circuit Terminals:
R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, ⏚ , B1, B2, +1, +2, -

Model	Max. Wire Gauge	Min. Wire Gauge	Torque (±10%)
HCRDA0250C1000T	1/0 AWG (53.5mm^2)	1 AWG (42.4mm^2)	M8 80kg-cm (69.4 lb-in.) (7.848Nm)
HCRDA0300C1000T		1/0 AWG (53.5mm^2)	
HCRDA0400C1000T		1/0 AWG (53.5mm^2)	
HCRDC0300C1000T		4 AWG (21.2mm^2)	
HCRDC0400C1000T		4 AWG (21.2mm^2)	
HCRDC0500C1000T		2 AWG (33.6mm^2)	

NOTE: UL installations must use 600V, 75°C or 90°C wire. Use copper wire only.
Terminal D+ [+2 & +1]:
Torque: 90 Kg-cm [78.2 lb-in.] (8.83Nm) (±10%)
use 600V, 90°C wired for UL installation for HCRDA0400C1000T install in ambient temperature exceeds 40°C.

FRAME D

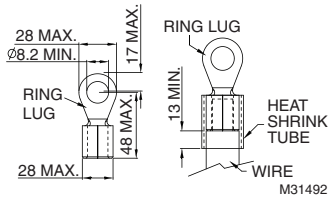


M33256

Main Circuit Terminals:
R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, ⏚ , +1/DC+, -/DC-

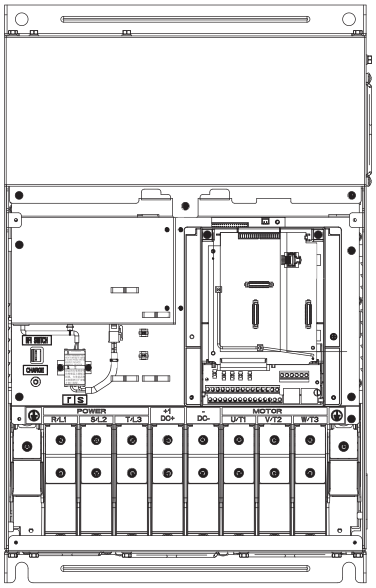
Model	Max. Wire Gauge	Min. Wire Gauge	Torque (±10%)
HCRDA0500D1000T	4/0 AWG (107mm^2)	4/0 AWG (107mm^2)	M8 200kg-cm (173 lb-in.) (19.62Nm)
HCRDA0600D1000T		4/0 AWG (107mm^2)	
HCRDC0600D1000T		1/0 AWG (53.5mm^2)	
HCRDC0750D1000T		2/0 AWG (67.4mm^2)	
HCRDC1000D1000T		4/0 AWG (107mm^2)	
HCRDC1250D1000T		4/0 AWG (107mm^2)	

1. UL installations must use 600V, 75°C or 90°C wire. Use copper wire only.
   HCRDC0600D1000T and HCRDC1250D1000T must use 90°C wire.
2. Figure on the left (below) shows the terminal specification.
3. Figure on the right (below) shows the specifications of insulated heat shrink tubing that comply with UL (600C, YDPU2).
4. Specification of ground wire ⏚ : It needs to be at least the same size as the Min. Wire Gauge listed above.



M31492

FRAME E



M33257

Main Circuit Terminals:
R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, ⏚ +1/DC+, -/DC-

Model	Max. Wire Gauge	Min. Wire Gauge	Torque (±10%)
HCRDA0750E1000T	4/0 AWG*2 (107mm2*2)	2/0 AWG*2 (67.4mm^2*2)	M8 200kg-cm (173 lb-in.)
HCRDA1000E1000T		3/0 AWG*2 (85mm^2*2)	
HCRDA1250E1000T		4/0 AWG*2 (107mm^2*2)	

1. UL installations must use 600V, 75°C or 90°C wire. Use copper wire only.
2. Figure 1: The usage of ring terminals should comply with the specifications shown in the figure.
3. Figure 2 grounding wire specifications: 300MCM*2 [152mm2*2]TorqueM8 180Kg-cm [156 lb-in.] (17.64Nm) (±10%).
4. Figure 3 shows the specifications of insulated heat shrink tubing that comply with UL (600C, YDPU2).

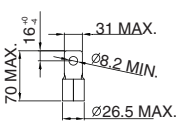


FIGURE 1

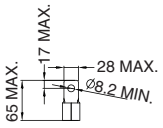


FIGURE 2

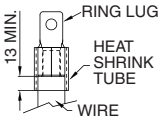


FIGURE 3

M31491

CHAPTER 6: CONTROL CIRCUIT TERMINAL

For multi-function input and output terminal, remove the top cover before wiring

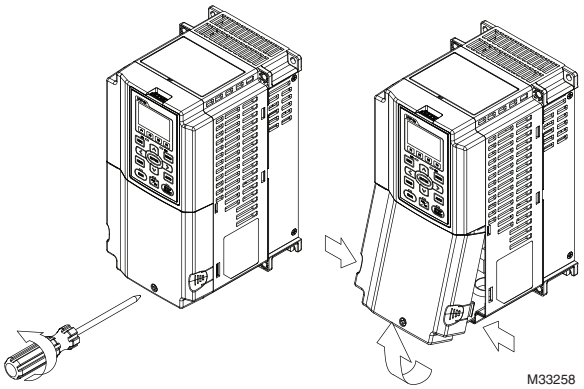
The figures shown in the diagram below are for reference only.

Remove the cover for wiring. Frame A~E

Frame A & B

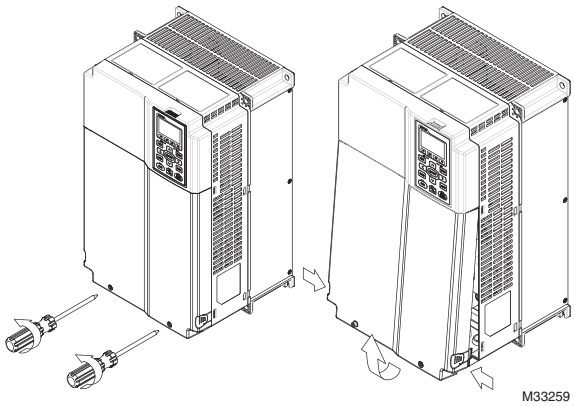
Loosen the screws and press the tabs on both sides to remove the cover.

Screw torque: 12~15Kg-cm [10.4~13lb-in.]



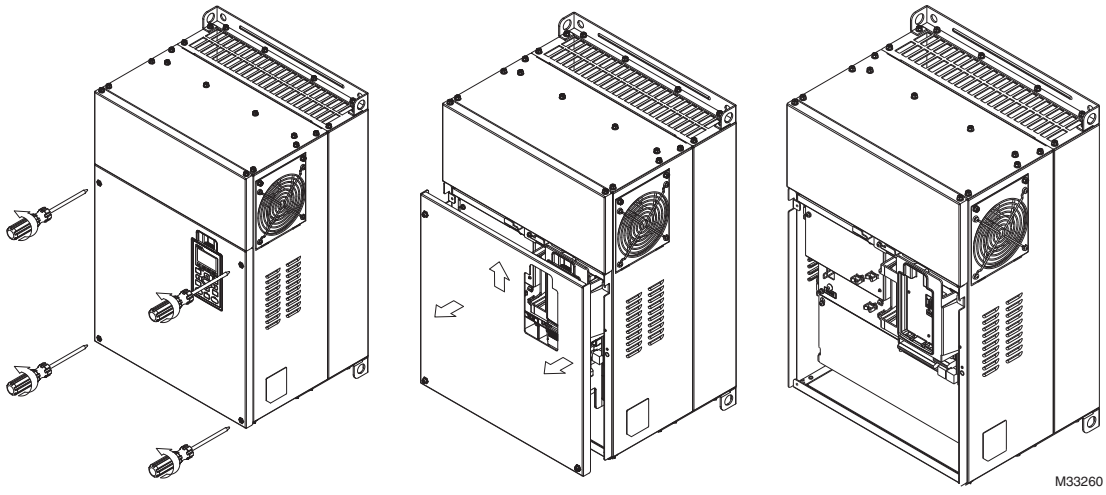
Frame C & D

Screw torque: 12~15Kg-cm [10.4~13lb-in.]



Frame E

Screw torque: 12~15Kg-cm [10.4~13lb-in.] Slightly lift the cover, then pull outward for removal.



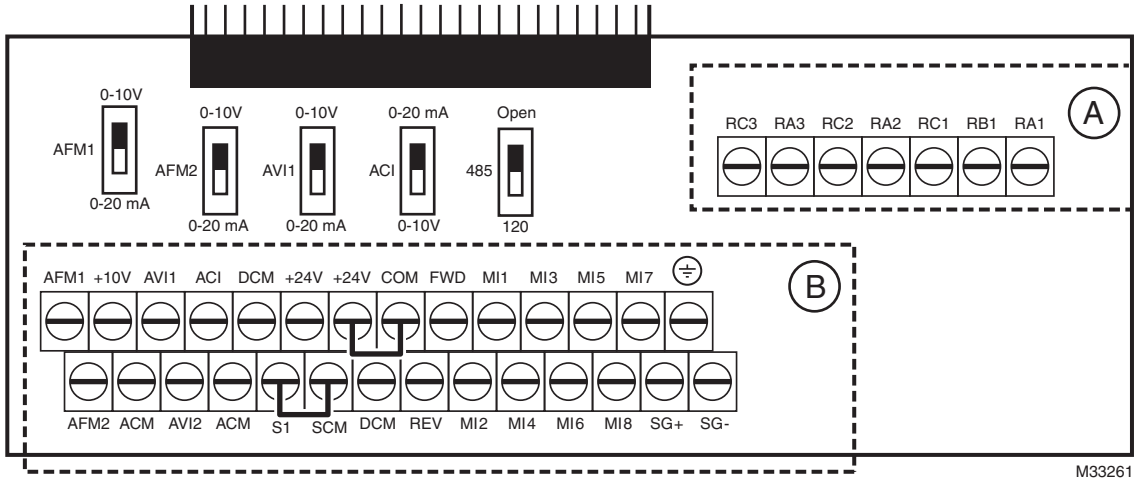


Fig. 1. Removable terminal block.

Control Terminal Specifications

Wire Gauge: 26~16AWG (0.1281-1.318mm^2)

Screw Torque: (A) 5kg-cm [4.31lb-in.] (0.49Nm) (As shown in Fig. 1 above.)

(B) 8kg-cm [6.94lb-in.] (0.78Nm) (As shown in Fig. 1 above)

Wiring precautions:

- Reserve a bare wire strip of 5mm and properly install the wire into the terminal; tighten the installation with a slotted screwdriver. If the wire is stripped, sort the wire before installation into the terminal.
- Use a flathead screwdriver: blade width 3.5mm, tip thickness 0.6mm
- In the Fig. 1 above, the factory setting for S1-SCM is short circuit. The factory setting for +24V-COM is short circuit and SINK mode (NPN); please refer to Chapter 4 Wiring for more detail.

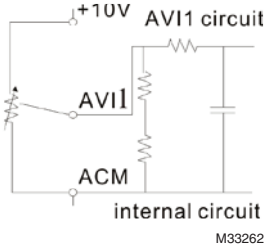
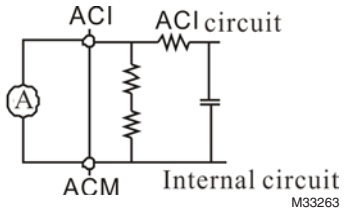
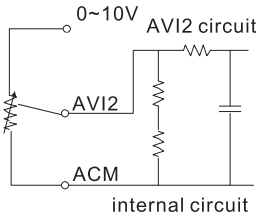
Table 1. Control terminal specifications.

Terminals	Terminal Function	Factory Setting (NPN mode)
+24V	Digital control signal common (Source)	+24V±5% 200mA
COM	Digital control signal common (Sink)	Common for multi-function input terminals
FWD	Forward-Stop command	FWD-DCM: ON → forward running OFF → deceleration to stop
REV	Reverse-Stop command	REV-DCM: ON → reverse running OFF → deceleration to stop
MI1 ~ MI8	Multi-function input 1~8	Refer to parameters 02-01~02-08 to program the multi-function inputs MI1~MI8. ON: the activation current is 6.5mA 11Vdc OFF: leakage current tolerance is 10μA 11Vdc
DCM	Digital frequency signal common	

Table 1. Control terminal specifications.

<table>
<tr><td>RA1</td><td>Multi-function relay output 1 (N.O.) a</td><td rowspan="8">Resistive Load:
5A(N.O.)/3A(N.C.) 250VAC
5A(N.O.)/3A(N.C.) 30VDC

Inductive Load (COS 0.4):
2.0A(N.O.)/1.2A(N.C.) 250VAC
2.0A(N.O.)/1.2A(N.C.) 30VDC

It is used to output each monitor signal, such as drive is in operation, frequency attained or overload indication.</td></tr>
<tr><td>RB1</td><td>Multi-function relay output 1 (N.C.) b</td></tr>
<tr><td>RC1</td><td>Multi-function relay common (Relay)</td></tr>
<tr><td>RA2</td><td>Multi-function relay output 2 (N.O.) a</td></tr>
<tr><td>RC2</td><td>Multi-function relay common (Relay)</td></tr>
<tr><td>RA3</td><td>Multi-function relay output 3 (N.O.) a</td></tr>
<tr><td>RC3</td><td>Multi-function relay common (Relay)</td></tr>
<tr><td>+10V</td><td>Potentiometer power supply</td><td>Analog frequency setting: +10Vdc 20mA</td></tr>
<tr><td>AVI1 (AVI)</td><td>Analog voltage input
 
</td><td>Impedance: 20Ω
Range: 0~ 20mA/0~10V =0~ Max. Output Frequency (Pr.01-00)
AVI switch, factory setting is 0~10V</td></tr>
<tr><td>ACI</td><td>Analog current input
 
</td><td>Impedance: 250Ω
Range: 0 ~ 20mA/0~10V=0~ Max. Output Frequency (Pr.01-00)
ACI Switch, factory setting is 0~20mA</td></tr>
<tr><td>AVI2
(AUI)</td><td>Auxiliary analog voltage input
 
</td><td>Impedance: 20kΩ
Range: 0 ~ +10VDC=0~ Max. Output Frequency (Pr.01-00)</td></tr>
<tr><td>AFM1

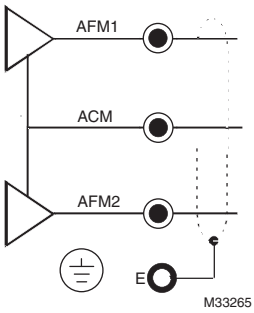
AFM2</td><td> 
</td><td>Impedance: 100Ω (current output)
Output current: 20mA max
Resolution: 0~10V corresponds to Max. operation frequency
Range: 0~10V → 0~20mA
AFM Switch: factory setting is 0~10V</td></tr>
<tr><td>ACM</td><td>Analog Signal Common</td><td>Common for analog terminals</td></tr>
</table>

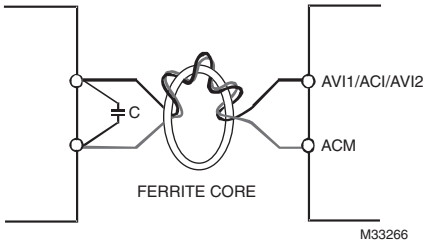
Table 1. Control terminal specifications.

S1	Factory setting: short-circuit
SCM	Power removal safety function for emergency stop.
SG+	Modbus RS-485
SG-	PIN 1,2,7,8: Reserved PIN 3, 6: GND PIN 4: SG- PIN 5: SG+

NOTE: Wire size of analog control signals: 18 AWG (0.75 mm^2) with shielded wire

Analog input terminals (AVI 1, ACI, AVI 2, ACM)

- Analog input signals are easily affected by external noise. Use shielded wiring and keep it as short as possible [less than 20 meters (65.6168 feet)] with proper grounding. If the noise is inductive, connecting the shield to terminal ACM can bring improvement.
- This way of using contacts in a circuit should be able to process weak signals at the bifurcated contacts. Do not use contacts to control the terminal ACM.
- If the analog input signals are affected by noise from the VFD, connect a capacitor and ferrite core as indicated in the following diagram.



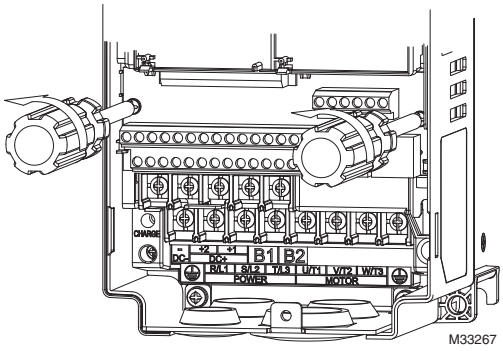
NOTE: The value of the capacitor is 0.1~0.01uF; if there is no noise issue, the capacitor is not necessary.

Digital inputs (FWD, REV, MI1~MI8, COM)

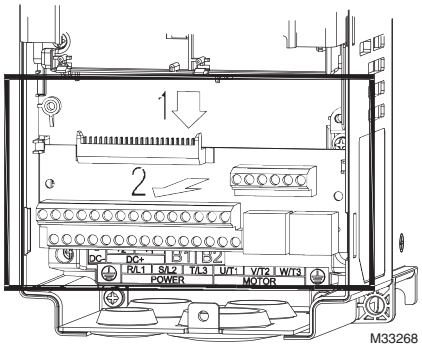
- When using contacts or switches to control the digital inputs, use high quality components to avoid contact bounce.

Remove the Terminal Block

1. Loosen the screws using a screwdriver (see figure below).



2. Remove the control board by pulling it out for a distance 6~8 cm (see 1 in the figure below) then lift the control board upward (see 2 in the figure below).



CHAPTER 7: OPTIONAL COMPONENTS

The components listed in this chapter are optional. Please contact Honeywell local distributors or Honeywell customer services for product availability.

List of Optional Components:

- Non-fuse Circuit Breaker (Field supplied)
- Fuse (Field supplied)
- Replacement Keypad
- Keypad Mounting Kit
- Conduit Box Kit (For frame D and E)
- Replacement Fan Kits
- Flange Mounting Kit
- USB/RS-485 Communication Interface

Non-fuse Circuit Breaker

To comply with UL standard: Per UL 508, paragraph 45.8.4, part a:

The rated current of the breaker shall be 2~4 times of the maximum rated input current of VFD.

3-phase 230V		3-phase 460V	
Model	**Recommended non-fuse breaker (A)**	**Model**	**Recommended non-fuse breaker (A)**
HCRDA0010A1000T	15	HCRDC0010A1000T	5
HCRDA0020A1000T	20	HCRDC0020A1000T	10
HCRDA0030A1000T	30	HCRDC0030A1000T	15
HCRDA0050A1000T	40	HCRDC0050A1000T	20
HCRDA0075A1000T	50	HCRDC0075A1000T	30
HCRDA0100B1000T	60	HCRDC0100A1000T	40
HCRDA0150B1000T	100	HCRDC0150B1000T	50
HCRDA0200B1000T	125	HCRDC0200B1000T	60
HCRDA0250C1000T	150	HCRDC0250B1000T	75
HCRDA0300C1000T	200	HCRDC0300C1000T	100
HCRDA0400C1000T	225	HCRDC0400C1000T	125
HCRDA0500D1000T	250	HCRDC0500C1000T	150
HCRDA0600D1000T	300	HCRDC0600D1000T	175
HCRDA0750E1000T	400	HCRDC0750D1000T	250
HCRDA1000E1000T	450	HCRDC1000D1000T	300
HCRDA1250E1000T	600	HCRDC1250D1000T	300

Fuse

Fuses with specification smaller than the data in the following table are allowed.

Model 230V	Input Current I(A)		Line Fuse	
	Normal duty	**Heavy duty**	**I (A)**	**Bussmann P/N**
HCRDA0010A1000T	6.4	3.9	15	JJN-15
HCRDA0020A1000T	9.6	6.4	20	JJN-20
HCRDA0030A1000T	15	12	30	JJN-30
HCRDA0050A1000T	22	16	40	JJN-40
HCRDA0075A1000T	25	20	50	JJN-50
HCRDA0100B1000T	35	28	60	JJN-60
HCRDA0150B1000T	50	36	100	JJN-100
HCRDA0200B1000T	65	52	125	JJN-125
HCRDA0250C1000T	83	72	150	JJN-150
HCRDA0300C1000T	100	83	200	JJN-200
HCRDA0400C1000T	116	99	225	JJN-225
HCRDA0500D1000T	146	124	250	JJN-250
HCRDA0600D1000T	180	143	300	JJN-300
HCRDA0750E1000T	215	171	400	JJN-400
HCRDA1000E1000T	276	206	450	JJN-450
HCRDA1250E1000T	322	245	600	JJN-600

Model 460V	Input current (A)		Line Fuse	
	Normal duty	Heavy duty	I (A)	Bussmann P/N
HCRDC0010A1000T	4.3	3.5	10	JJS-10
HCRDC0020A1000T	5.4	4.3	10	JJS-10
HCRDC0030A1000T	7.4	5.9	15	JJS-15
HCRDC0050A1000T	11	8.7	20	JJS-20
HCRDC0075A1000T	18	15.5	30	JJS-30
HCRDC0100A1000T	20	17	40	JJS-40
HCRDC0150B1000T	25	20	50	JJS-50
HCRDC0200B1000T	33	26	60	JJS-60
HCRDC0250B1000T	39	35	75	JJS-75
HCRDC0300C1000T	47	40	100	JJS-100
HCRDC0400C1000T	58	47	125	JJS-125
HCRDC0500C1000T	76	63	150	JJS-150
HCRDC0600D1000T	91	74	175	JJS-175
HCRDC0750D1000T	110	101	250	JJS-250
HCRDC1000D1000T	144	114	300	JJS-300
HCRDC1250D1000T	180	157	300	JJS-300

Replacement Keypad: HCRDKEYPAD/U

A: LED DISPLAY
DISPLAY FREQUENCY, CURRENT, VOLTAGE, AND ERROR, ETC.

B: STATUS INDICATOR
F: FREQENCY COMMAND
H: OUTPUT FREQUENCY
U: USER DEFINED UNITS
ERR: COMM ERROR INDICATOR
RUN: COMM RUN INDICATOR

C: FUNCTION
(REFER TO THE CHART THAT FOLLOWS FOR DETAIL DESCRIPTION)

MCR33299

Table 1. Descriptions of Keypad Functions

Key	Descriptions
RUN	This is the RUN/START command to the VFD when in Hand/Keypad control only.
	It can operate the VFD by the function setting and the RUN LED will be ON.
STOP RESET	Stop Command Key. This key has the highest processing priority in any situation. Drive will always STOP when this button is pressed.
	The RESET key can be used to reset the drive after the fault occurs. For those faults that can't be reset by the RESET key, see the fault records after pressing MENU key for details.
FWD REV	This key controls the operational direction of the motor. NOT activated out of the box.
ENTER	Press ENTER and go to the next submenu. If at the parameter level, press enter to modify and press enter to save changes
ESC	ESC key function is to leave current menu and return to the last menu. It is also functioned as a return key in the sub-menu.
MENU	Press menu to return to main menu. See main menu descriptions on following pages.

Table 1. Descriptions of Keypad Functions

	RIGHT and LEFT arrows to move the cursor with a numeric parameter, or to enter into and out of menus.
	UP and DOWN arrows used to change numeric parameter values, or cycle through menu options.
	Function Keys - will have different functions at different times as displayed on the screen. Used during Wizard Mode.
	Pressing the HAND key will take the VFD into Hand control, where the user can control the motor Frequency and START and STOP.
	Pressing this key will revert the VFD to remote/Automatic control from a remote speed and start command source.

Table 2. Descriptions of LED Functions

LED	Descriptions
	Steady ON: operation indicator for the VFD, including DC brake, zero speed, standby, restart after fault and speed search.
	Blinking: VFD is decelerating to stop.
	Steady OFF: VFD is not running.
	Steady ON: VFD is stopped.
	Blinking: VFD is in the standby status.
	Steady OFF: VFD running.
	Operation Direction LED (green: forward running, red: reverse running).
	Blinking: drive is changing the operation direction.
	HAND LED: HAND LED is on (HAND mode); HAND LED is off (AUTO mode).
	AUTO LED: AUTO LED is on (AUTO mode); AUTO LED is off (HAND mode).

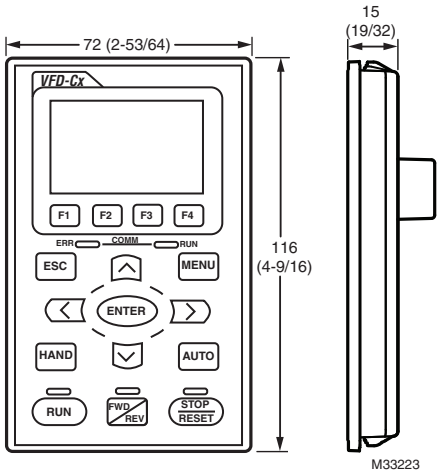


Fig. 1. Keypad Dimensions: mm (inches).

Keypad Mounting Kit: HCRDMOUNTKIT/U

The Remote Keypad Mounting Kit can be used to mount the keypad on a wall or into the face of a remote panel. Only one keypad, on the drive or remotely mounted, may be used to interface with the drive at any one time.

NOTE: The Cat 5 cable that connects the drive to the keypad must be purchased locally for the desired length. The maximum cable length is 100 ft (30.5m).

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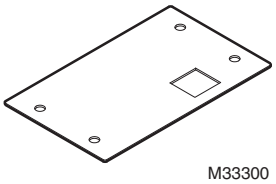
Wall Mounting

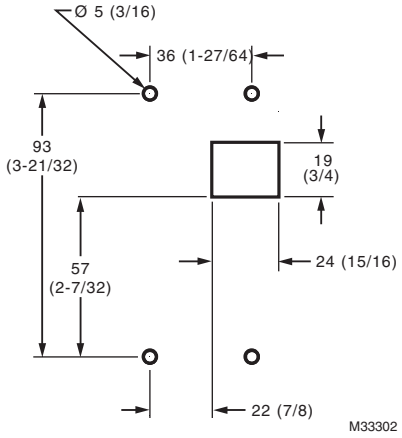
1. Panel for wall mounting (1 piece)



M33300

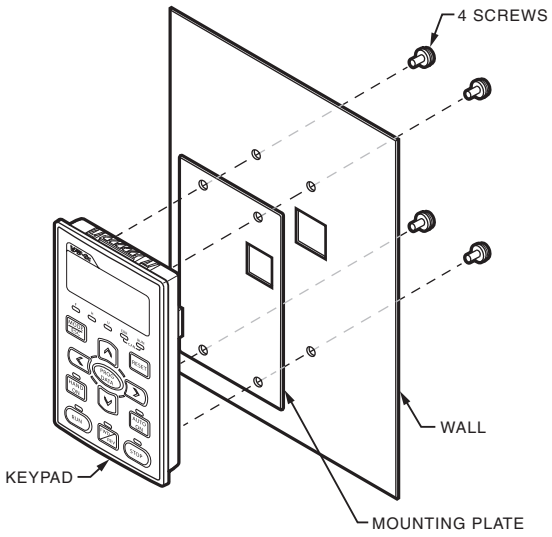
Screw (4 pieces) ~M4*p 0.7 *L8 mm
Torque 10-12 kg-cm (8.7-10.4 lb-in.)

2. Panel cutout dimension. Units in in. (mm)



M33302

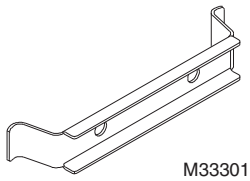
3. As shown in the image below, place the keypad on the mounting plate. Then screw the four (4) M4 size screws to secure the keypad on the wall.
Torque 10-12kg-cm (8.7-10.4lb-in.)



M33304

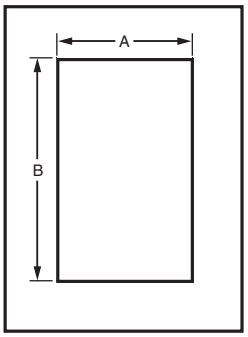
Embedded Mounting

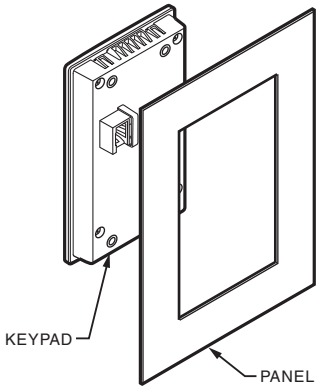
1. Side bracket (2 pieces)



Screw *4 ~M4*p 0.7 *L8 mm
Torque 10-12 kg-cm (8.7-10.4 lb-in.)

2. Panel cutout dimension. Units in in. (mm)





Normal Cutout Dimension in in. (mm)

Panel Thickness	0.047 (1.2)	0.063 (1.6)	0.079 (2.0)
A	2.614 (66.4)		
B	4.339 (110.2)	4.382 (111.3)	4.429 (112.5)

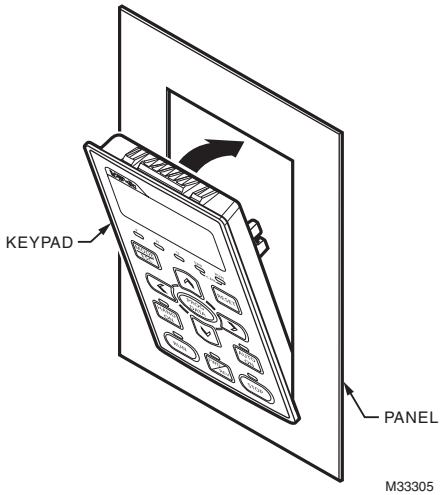
Deviation: ±0.0059 in. / ±0.15mm

Waterproof level (IP56) Cutout Dimension in in. (mm)

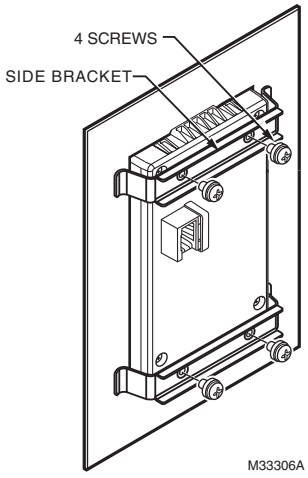
Panel Thickness	0.047 (1.2)	0.063 (1.6)	0.079 (2.0)
A	2.614 (66.4)		
B	4.382 (111.3)		

Deviation: ±0.0059 in. / ±0.15mm

3. As shown in the image below, insert the keypad into the center of the panel.



Then fit the keypad on the panel by tightening brackets on both sides with screws.



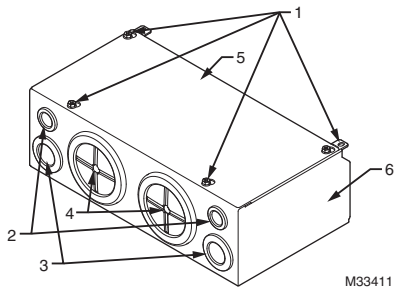
Conduit Box Kit

Frame D

208/ 230V: HCRDA0500D1000T,HCRDA0600D1000T

460V: HCRDC0600D1000T, HCRDC0750D1000T, HCRDC1000D1000T, HCRDC1250D1000T

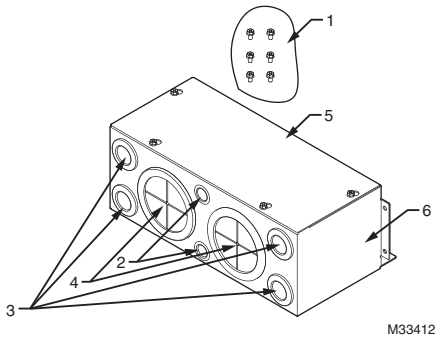
Item	Description	Qty.
1	Screw M5*0.8*10L	4
2	Rubber 28	2
3	Rubber 44	2
4	Rubber 88	2
5	Conduit box cover	1
6	Conduit box base	1



Frame E

208/230V: HCRDA0750E1000T, HCRDA1000E1000T, HCRDA1250E1000T

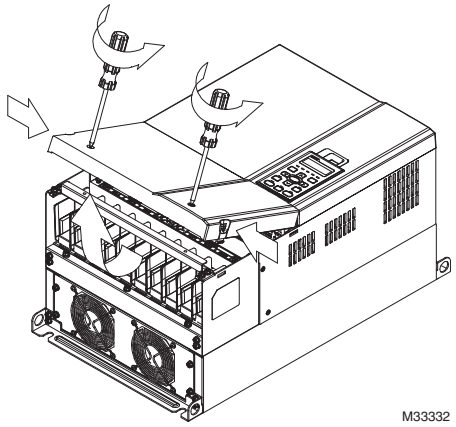
Item	Description	Qty.
1	Screw M5*0.8*10L	6
2	Bushing Rubber 28	2
3	Bushing Rubber 44	4
4	Bushing Rubber 100	2
5	Conduit box cover	1
6	Conduit box base	1



Installation of conduit box

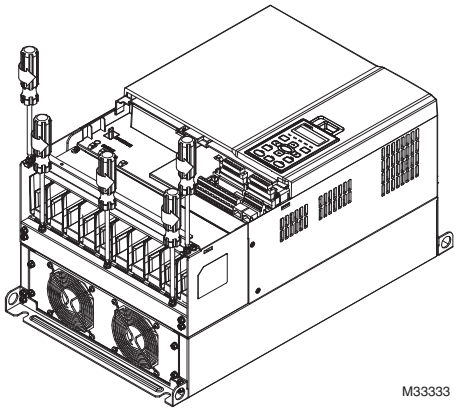
Frame D

1. Loosen the cover screws and press the tabs on each side of the cover to remove the cover, as shown in the following figure. Screw torque: 10~12kg-cm (8.66~10.39lb-in)



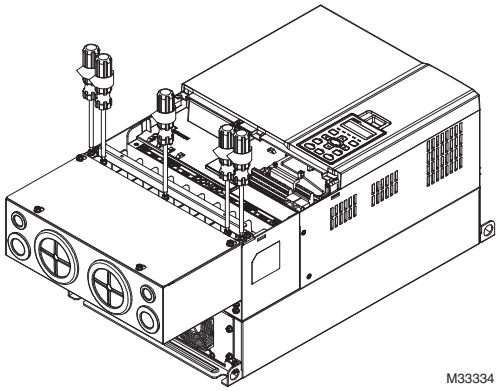
M33332

2. Remove the 5 screws shown in the following figure. Screw torque: 24~26kg-cm (20.8~22.6lb-in).



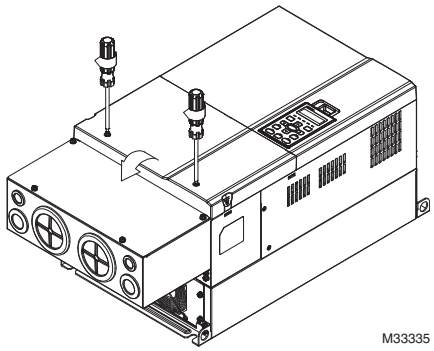
M33333

3. Install the conduit box by tightening the 5 screws shown in the following figure. Screw torque: 24~26kg-cm (20.8~22.6lb-in).



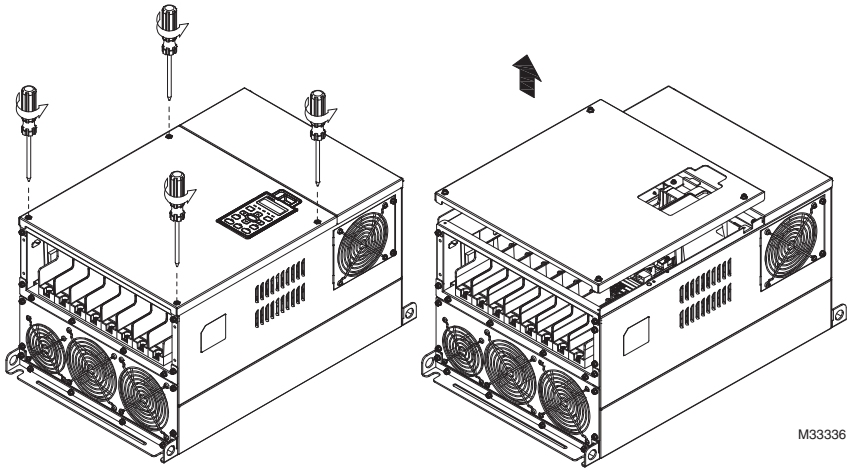
M33334

4. Tighten the **2** screws shown in the following figure. Screw torque: 10~12kg-cm (8.66~10.39lb-in).

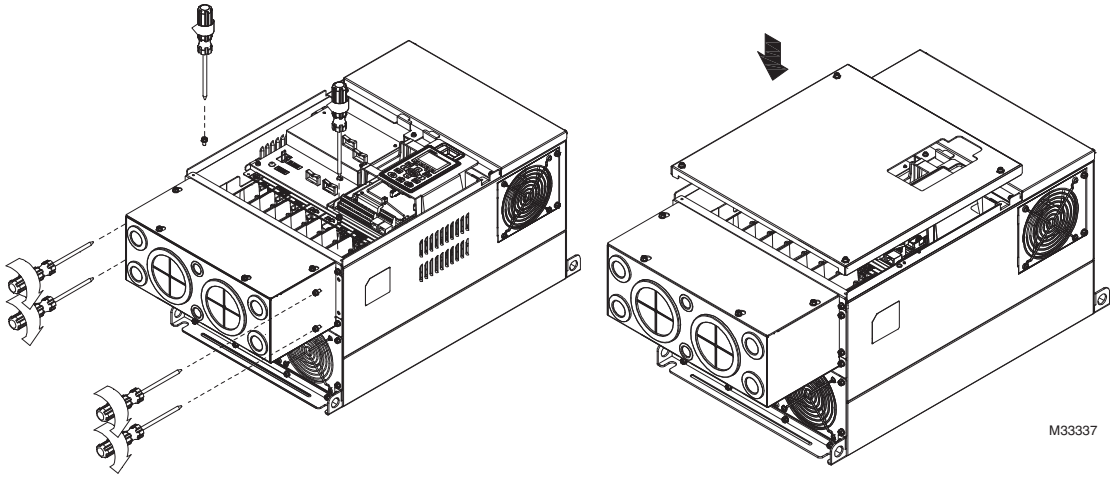


Frame E

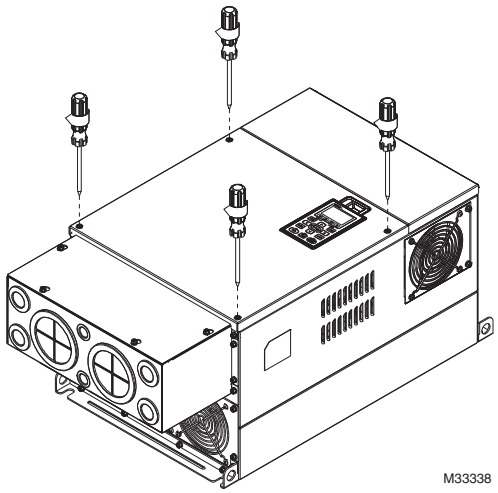
1. Loosen the 4 cover screws and lift the cover; Screw torque: 12~ 15 kg-cm (10.4~13lb-in).



2. Tighten the 6 screws shown in the following figure and place the cover back to the original position. Screw torque: 25~30kg-cm (20.8~30lb-in)



3. Tighten the 4 screws shown in the following figure. Screw torque:12~15kg-cm (10.4~13lb-in)』

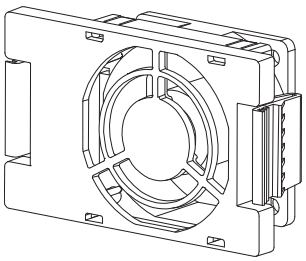


Replacement Fan Kits

Outer appearance of fans

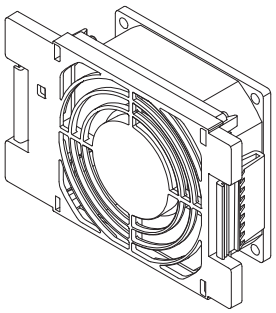
HCRDFANFRA1H/U: Heat Sink Cooling Fan, Frame A for 3 HP - 7.5 HP, 208/230V and 5 HP - 10 HP, 460V

HCRDA0030A1000T
HCRDA0050A1000T
HCRDA0075A1000T
HCRDC0050A1000T
HCRDC0075A1000T
HCRDC0100A1000T


M33339

HCRDFANFRB1H/U: Heat Sink Cooling Fan, Frame B for 10 HP, 208/230V and 15 HP, 460V

HCRDA0100B1000T
HCRDC0150B1000T

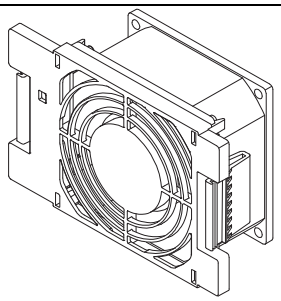

M33340

HCRDFANFRB2H/U: Heat Sink Cooling Fan, Frame B for 15 HP, 208/230V and 20 HP - 25 HP, 460V

HCRDA0150B1000T
HCRDC0200B1000T
HCRDC0250B1000T

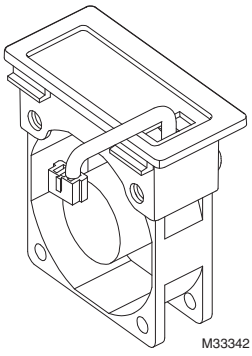
HCRDFANFRB3H/U: Heat Sink Cooling Fan, Frame B for 20 HP, 208/230V

HCRDA0200B1000T


M33341

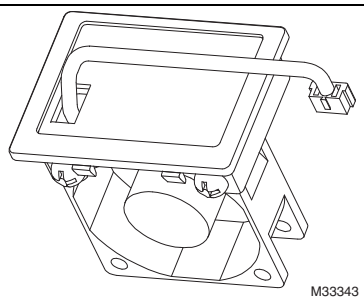
HCRDFANFRB1B/U: Board Assembly Cooling Fan Frame B for 10 HP - 20 HP, 208/230V and 15HP - 25 HP, 460V

HCRDA0100B1000T
HCRDA0150B1000T
HCRDA0200B1000T
HCRDC0150B1000T
HCRDC0200B1000T
HCRDC0250B1000T


M33342

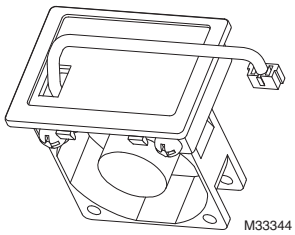
HCRDFANFRC1B/U: Board Assembly Cooling Fan Frame C for 25 HP - 40 HP, 208/230V

HCRDA0250C1000T
HCRDA0300C1000T
HCRDA0400C1000T


M33343

HCRDFANFRC2B/U: Board Assembly Cooling Fan Frame C for 30 HP - 50 HP, 460V

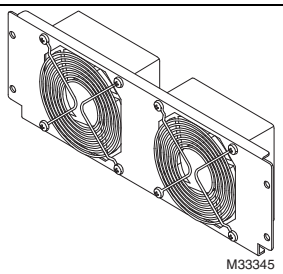
HCRDC0300C1000T
HCRDC0400C1000T
HCRDC0500C1000T


M33344

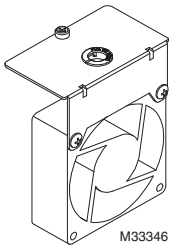
HCRDFANFRD1H/U: Heat Sink Cooling Fan Frame D for 50 HP - 60 HP, 208/230V and 60 HP - 125 HP, 460V

HCRDFANFRD1B/U: Board Assembly Cooling Fan D for 60 HP - 125 HP, 460V

HCRDA0500D1000T
HCRDA0600D1000T
HCRDC0600D1000T
HCRDC0750D1000T
HCRDC1000D1000T
HCRDC1250D1000T


M33345

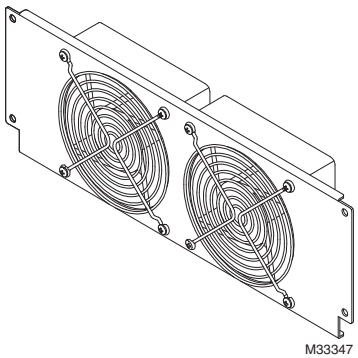
HCRDFANFRD1H/U: Heat Sink Cooling Fan


M33346

HCRDFANFRD1B/U: Board Assembly Cooling Fan

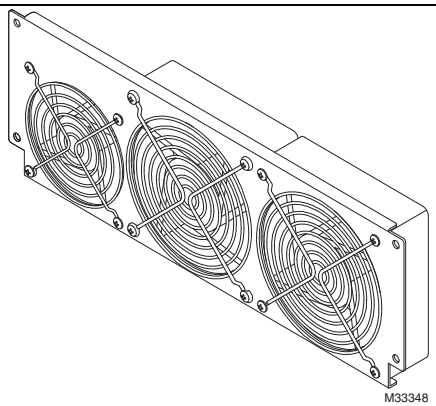
HCRDFANFRE1H/U: Heat Sink Cooling Fan, Frame E for 75 HP - 100 HP, 208/230V

HCRDA0750E1000T
HCRDA1000E1000T


M33347

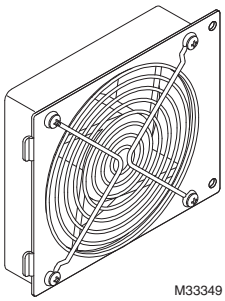
HCRDFANFRE2H/U: Heat Sink Cooling Fan, Frame E for 125HP, 208/230V

HCRDA1250E1000T


M33348

HCRDFANFRE1B/U: Board Assembly Cooling Fan, Frame E for 75 HP - 125 HP, 208/230V

HCRDA0750E1000T
HCRDA1000E1000T
HCRDA1250E1000T


M33349

Fan Removal

Heat Sink Cooling Fan Frame A

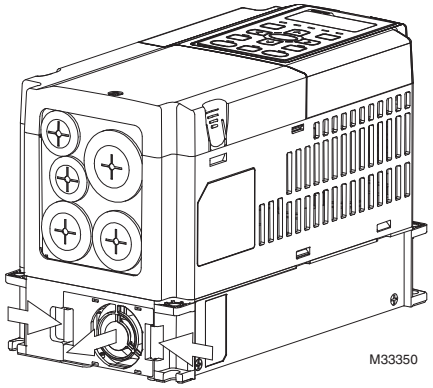
Corresponding models:

HCRDA0030A1000T, HCRDA0050A1000T, HCRDA0075A1000T, HCRDC0050A1000T

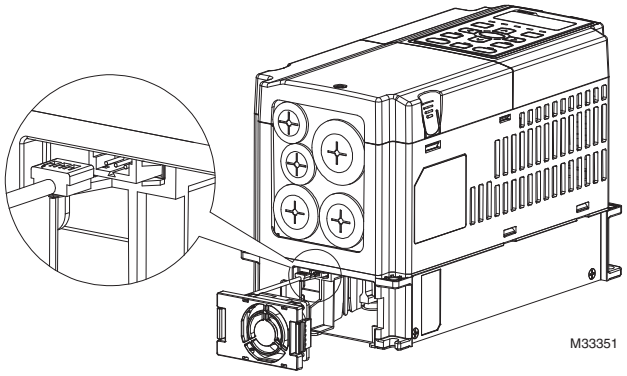
HCRDC0075A1000T, HCRDC0100A1000T

⚠ CAUTION
Disconnect fan power before removing the fan.

1. As shown by the arrow signs, press the tabs on both sides of the fan to remove it.



2. As shown by the partially enlarged image below, remove the fan from the unit.



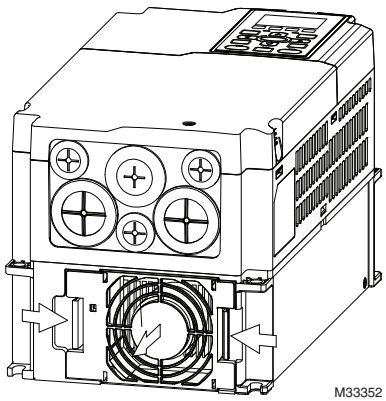
Heat Sink Cooling Fan Frame B

Corresponding models:

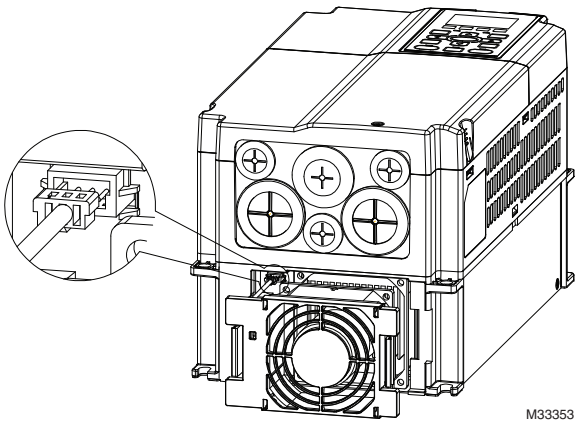
HCRDA0100B1000T, HCRDA0150B1000T, HCRDC0150B1000T

HCRDA0200B1000T, HCRDC0200B1000T, HCRDC0250B1000T

1. As shown by the arrow signs, press the tabs on both sides of the fan to remove it.



2. As shown by the partially enlarged image below, remove the fan from the unit.



Board Assembly Cooling Fan Frame B and Frame C

Corresponding models Frame B:

HCRDA0100B1000T, HCRDA0150B1000T, HCRDC0150B1000T

HCRDA0200B1000T, HCRDC0200B1000T

HCRDA0250C1000T, HCRDC0250B1000T

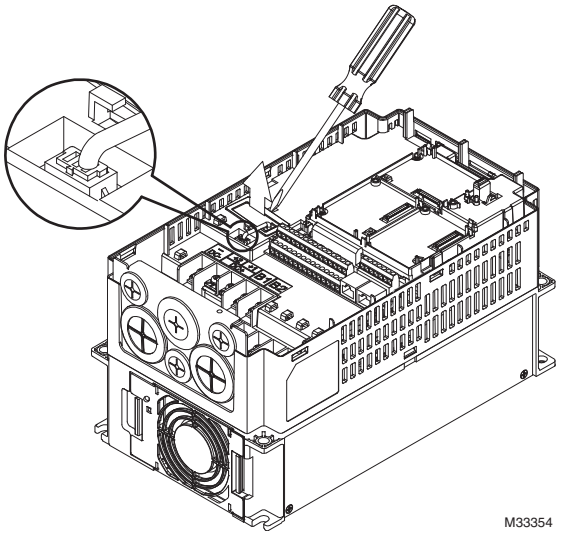
Corresponding models Frame C:

HCRDA0250C1000T, HCRDA0300C1000T, HCRDA0400C1000T

HCRDC0300C1000T, HCRDC0400C1000T

HCRDA0500D1000T

As shown by the partially enlarged image, disconnect the fan's power, then use a screwdriver to unclench and remove the fan.

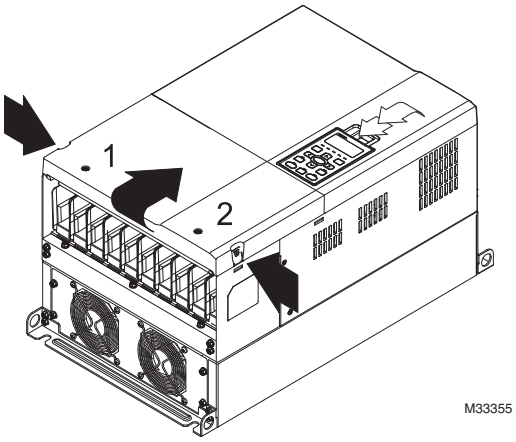


Heat Sink Cooling Fan Frame D

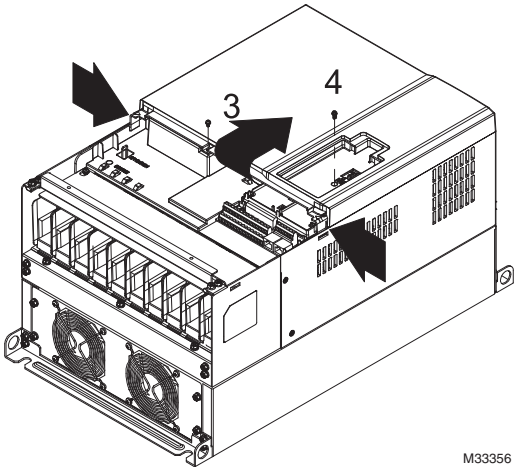
Corresponding models:

HCRDA0500D1000T, HCRDA0600D1000T, HCRDC0600D1000T, HCRDC0750D1000T, HCRDC1000D1000T, HCRDC1250D1000T

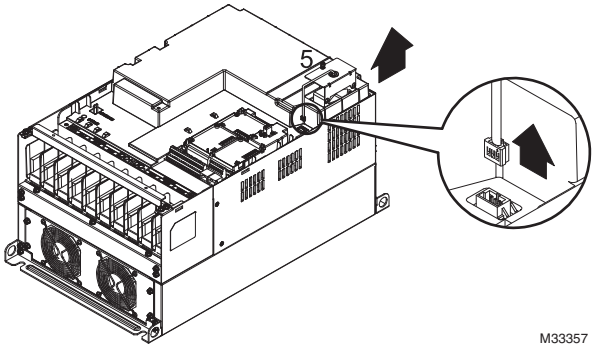
1. Loosen screw 1 and screw 2, then press the right and left sides to remove the cover, following the directions of the arrows. Press on top of the digital keypad to properly remove it. Screw torque: 10~12kg-cm (8.6~10.4lb-in).



2. Loosen screw 3 and screw 4, then press the tab on the right and left to remove the cover.
Screw torque: 6~8kg-cm (5.2~6.9lb-in)

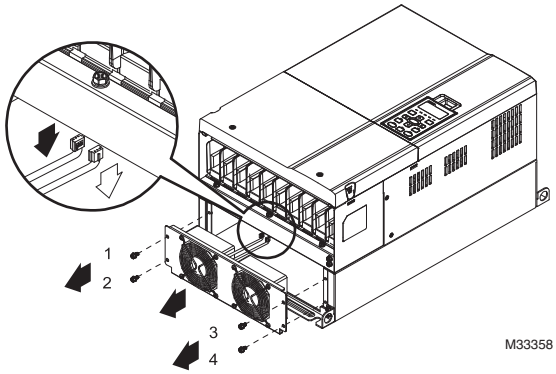


3. Loosen screw 5 and disconnect the fan's power. Screw torque: 10~12kg-cm (8.6~10.4lb-in).



4. Loosen screws 1~4. Screw torque: 24~26kg-cm (20.8~22.6lb-in).

5. Disconnect fan's power (as shown in the partially enlarged picture) and pull out the fan (as shown in the larger picture).



Heat Sink Cooling Fan Frame E

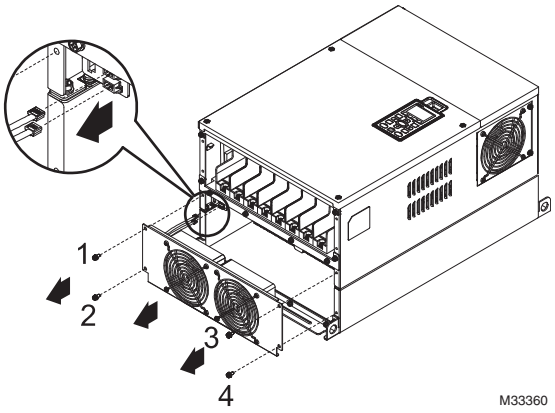
Corresponding models:

HCRDA0750E1000T, HCRDA1000E1000T, HCRDA1250E1000T

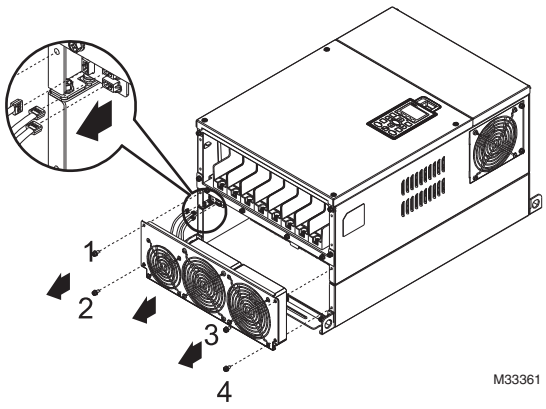
Follow the procedure for both models of the fan

Loosen screw 1~4 (as shown in the figure below), and disconnect the fan's power, then remove the fan.

Screw torque: 24~26kg-cm (20.8~22.6lb-in).



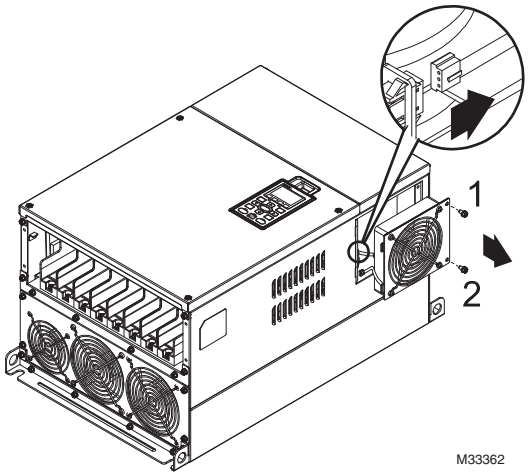
M33360



M33361

Loosen screw 1 and screw 2 (as shown in the figure below), and disconnect fan's power before removing the fan.

Screw torque: 24~26kg-cm (20.8~22.6lb-in).



M33362

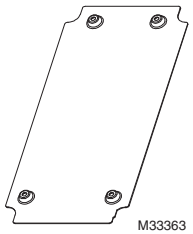
Flange Mounting Kit

Corresponding frames: Frames A ~E

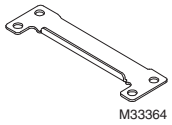
Frame A

Flange Mounting Kit Frame A Type 1

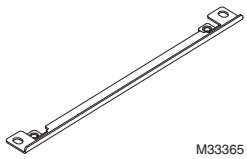
Corresponding models: HCRDA0030A1000T; HCRDA0050A1000T; HCRDC0050A1000T



Mounting Plate, 1 each



Side Bracket, 2 each



Side Bracket, 2 each

Screw 1 *4 each

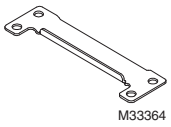
M3*P 0.5; L=6mm

Screws 2*8 each

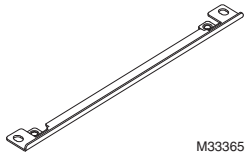
M6* 1.0; L=16mm

Flange Mounting Kit Frame A Type 2

Corresponding models: HCRDA0010A1000T; HCRDA0020A1000T; HCRDA0075A1000T; HCRDC0010A1000T; HCRDC0020A1000T; HCRDC0030A1000T;HCRDC0075A1000T; HCRDC0100A1000T



Side Bracket, 2 each



Side Bracket, 2 each

Screw 1 *8 each

M6*P 1.0; L=16mm

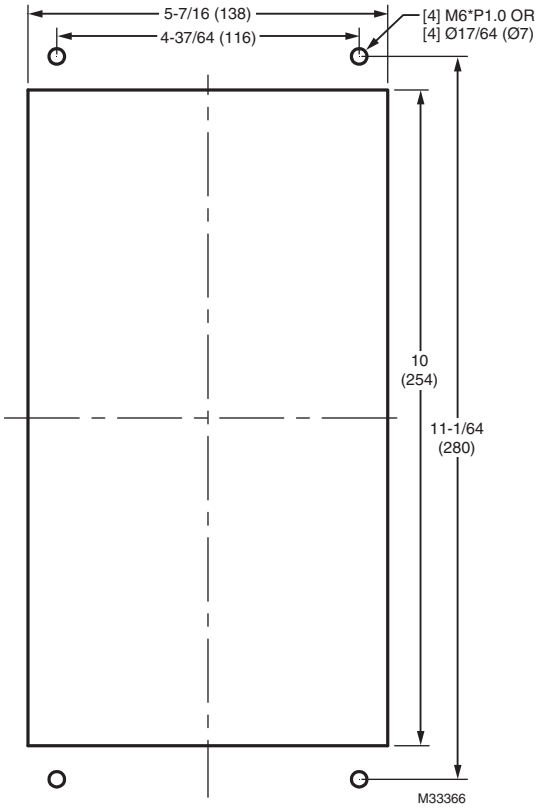
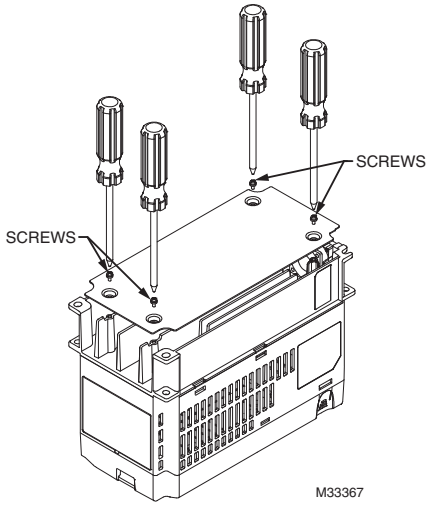


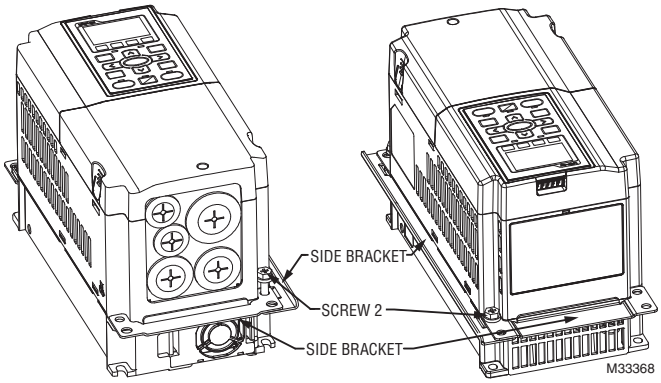
Fig. 2. Panel Cutout Diagram Frame A: Unit in in. (mm)

Installation of Flange Mouting Kit Type 1

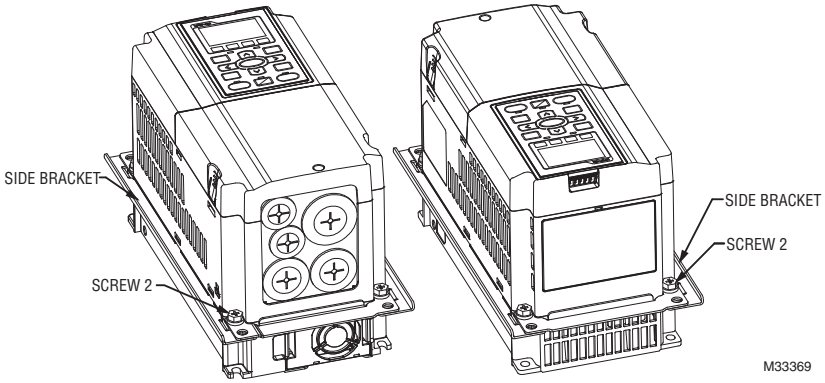
1. Install mounting plate by using 4 screws (M3). Screw torque: 6~8kg-cm (5.21~6.95lb-in).



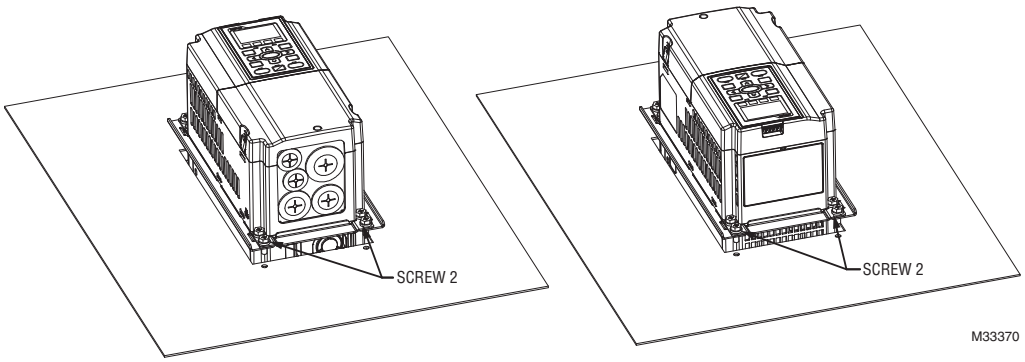
2. Install side bracket using 2 screws on one side (M6). Screw torque:25~30kg-cm (21.7~ 26.lb-in)



3. Install side brackets by using screws on the other side (M6). Screw torque:25~30kg-cm (21.7~26 lb-in)

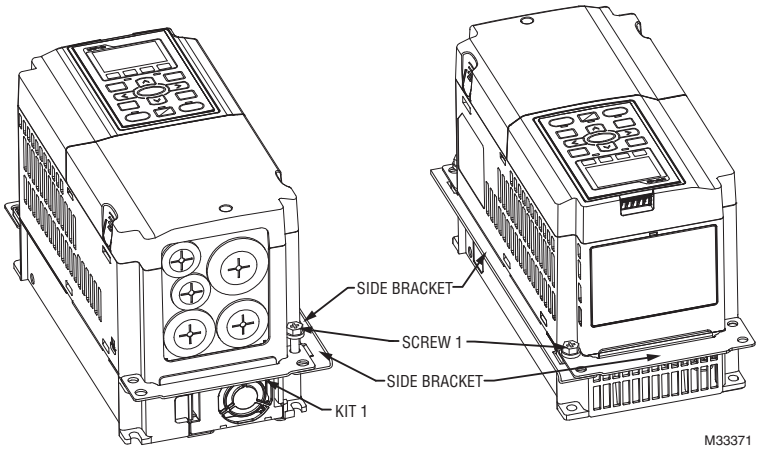


4. Mount VFD on the frame, using 4 screws (M6) through the side brackets and the plate, then fasten the screws. Screw torque: 25~30kg-cm (5.21~6.94lb-in).25~30kg-cm (21.7~26lb-in)』

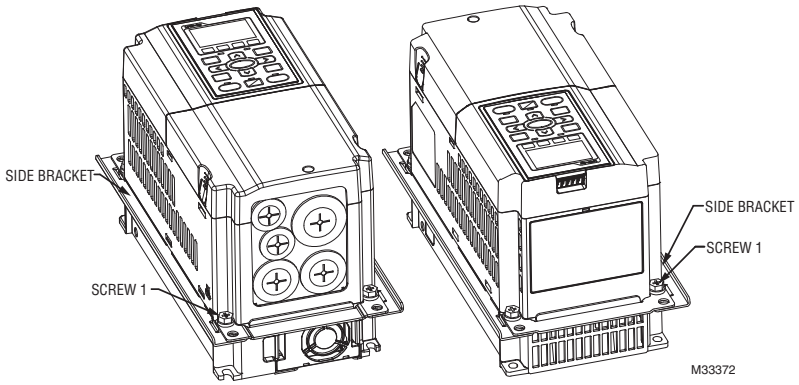


Installation of Flange Mounting Kit Type 2

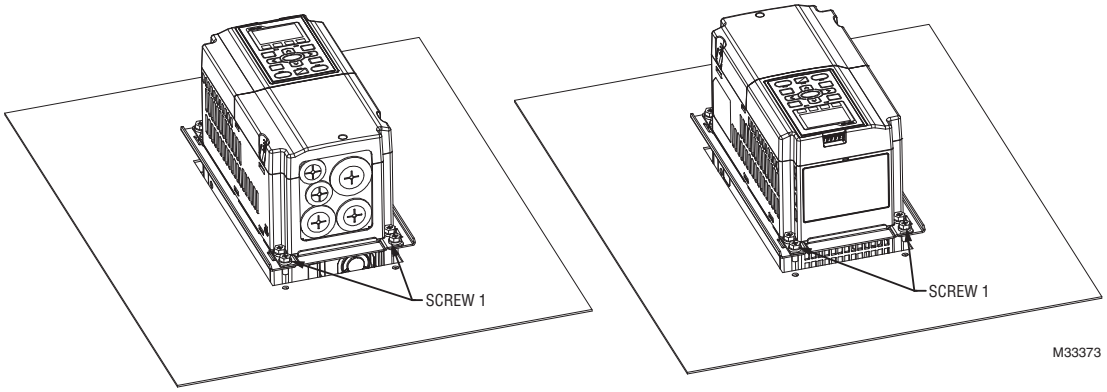
1. Install mounting plate by using 4 screws (M3). Screw torque:25~30kg-cm (21.7~26lb-in) 』
(As shown in the figures below)



2. Install side bracket using 2 screws on one side (M3). Screw torque: 25~30kg-cm (21.7~26lb-in) 』
(As shown in the figures below)



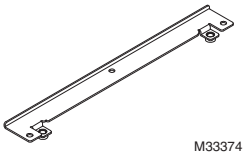
3. Mount VFD on the frame, using 4 screws (M6) through the side brackets and the plate, then fasten the screws. Screw torque: 25~30kg-cm (21.7~26 lb-in). (As shown in the figures below)



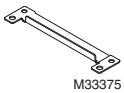
Frame B

Flange Mounting Kit Frame B

Corresponding models: All Frame B models



Side Bracket, 2 each



Side Bracket, 2 each

Screw 1 *4 each ~ M8*P 1.25;

Screw 2*6 each ~ M6*P 1.0;

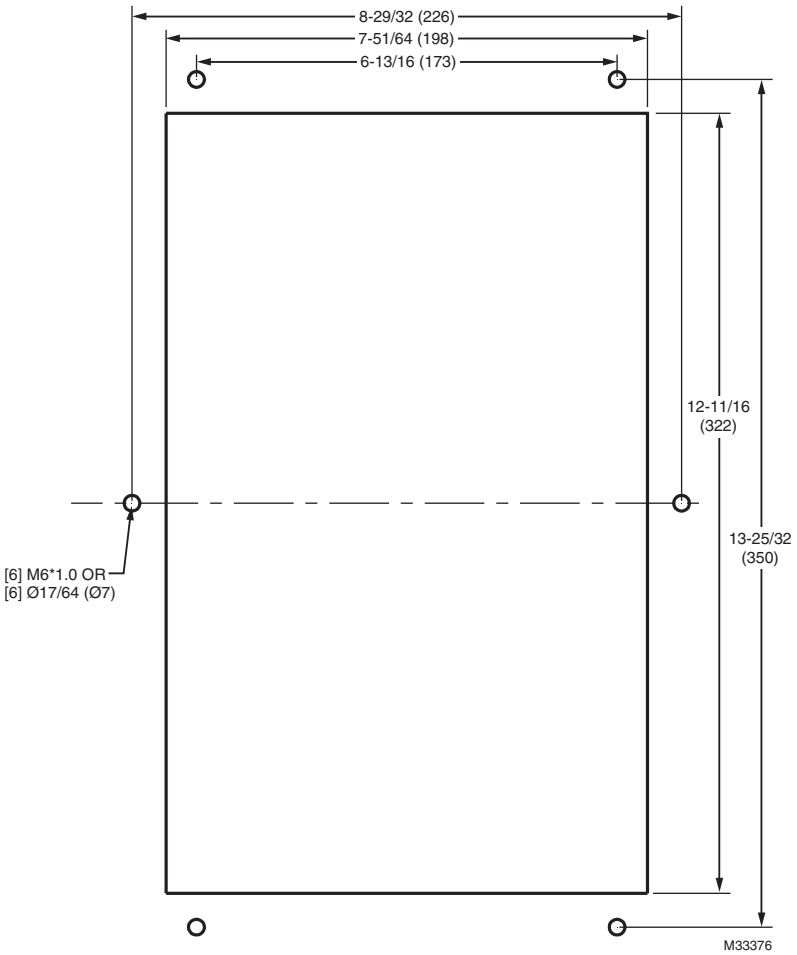
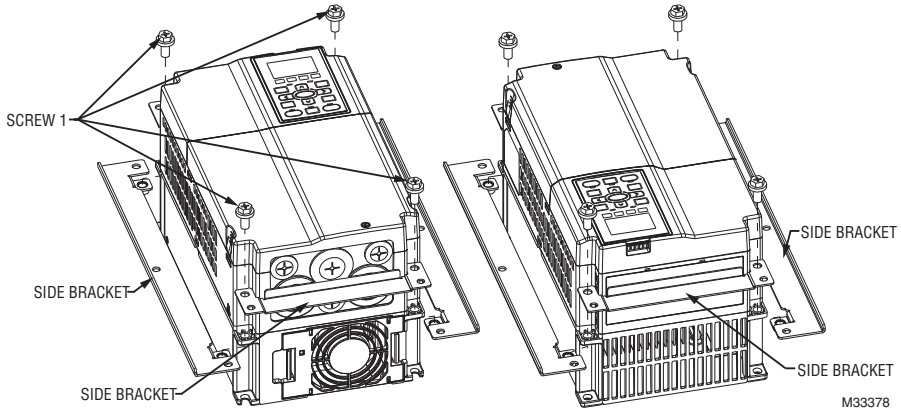


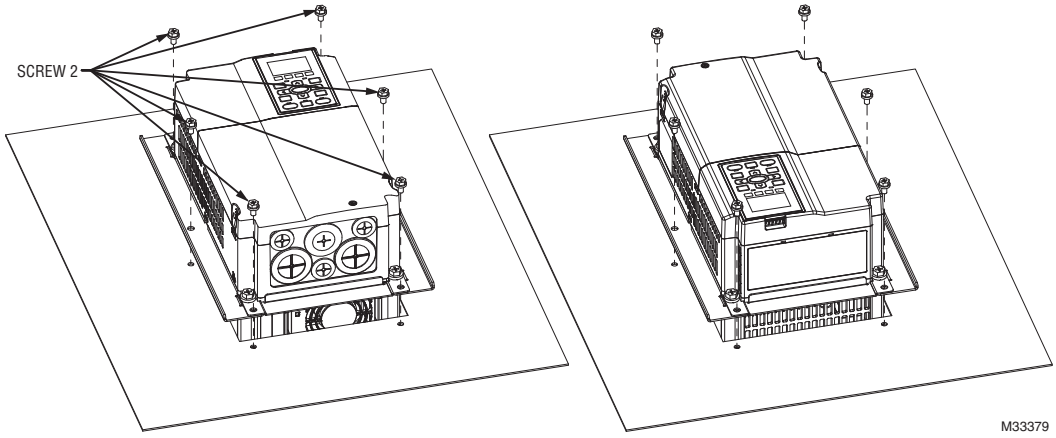
Fig. 3. Panel Cutout Diagram Frame B: Unit in in. (mm)

Installation of Flange Mounting Kit Frame B

1. Install side brackets using the screws provided (M8). Screw torque: 40~45kg-cm (34.7~39.0lb-in). (As shown in the following figure)



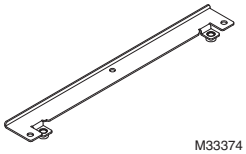
2. Mount VFD on the frame, using 6 screws (M6) through the side brackets and the plate, then fasten the screws. Screw torque: 25~30kg-cm (21.7~26lb-in). (As shown in the following figure)



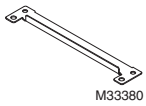
Frame C

Flange Mounting Kit Frame C

Corresponding models: All Frame C models



Side Bracket 2 each



Side Bracket 2 each

Screw 1 *4 pieces ~ M8*P 1.25;

Screw 2*8 pieces ~ M6*P 1.0

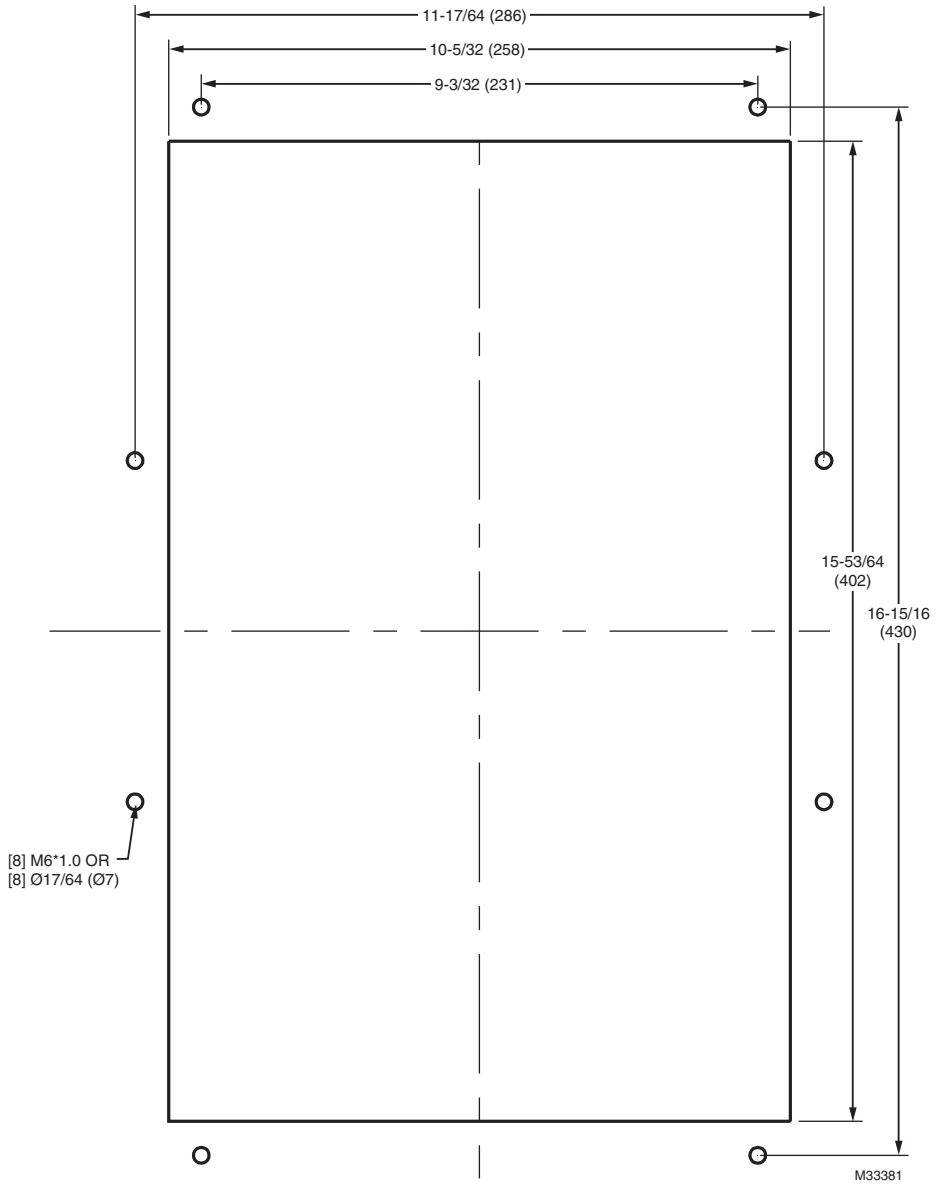
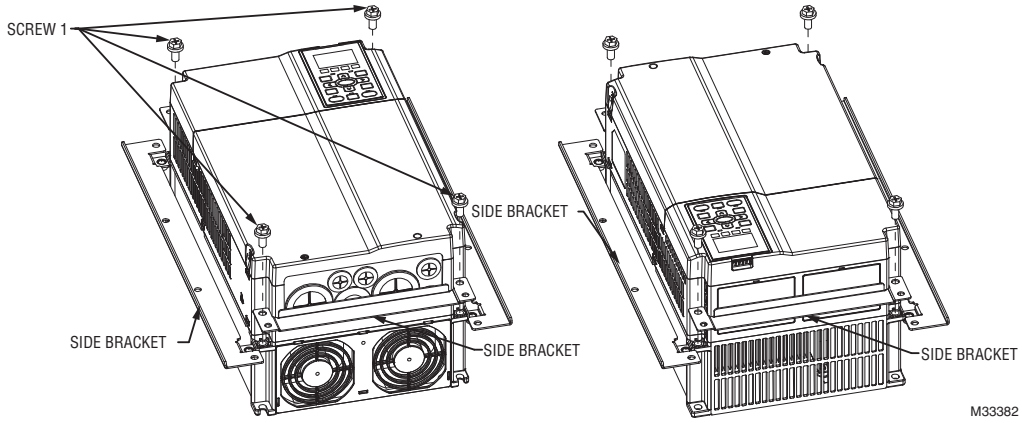


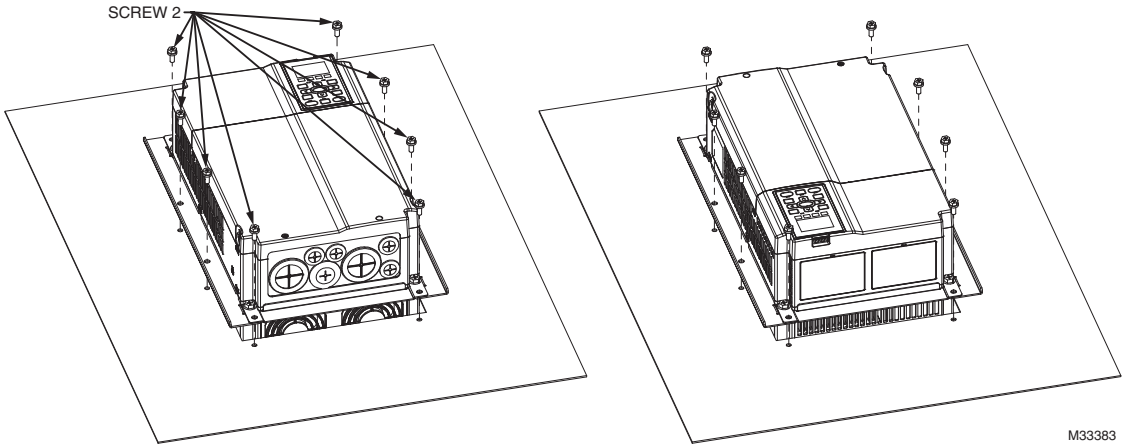
Fig. 4. Panel Cutout Diagram Frame C: Unit in in. (mm)

Installation of Flange Mounting Kit Frame C

1. Install side brackets by tightening 4 of the screw 1 (M8). Screw torque: 50~55kg-cm (43.4~47.7lb-in). (As shown in the figures below)



2. Plate installation, place 8 of the screw 2 (M6) through accessories 1 & 2 and the plate, then tighten the screws. Screw torque: 25~30kg-cm (21.7~26.0lb-in). (As shown in the figures below)



Frame D

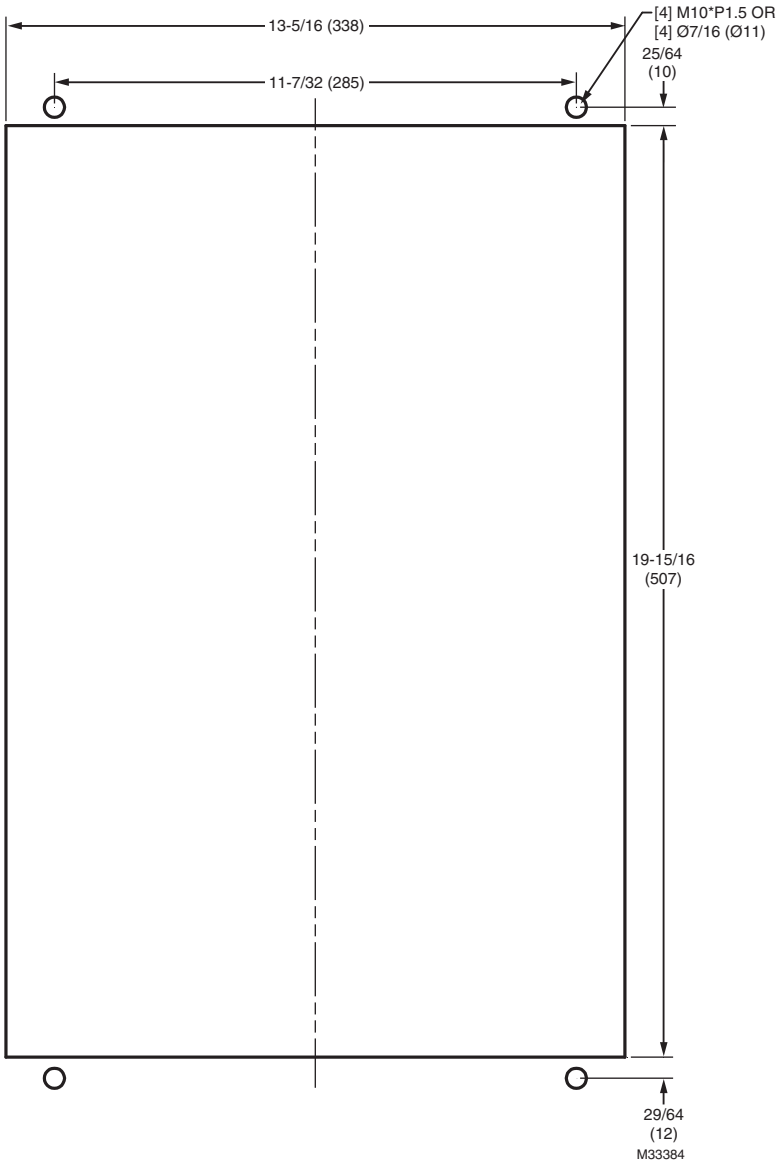


Fig. 5. Panel Cutout Diagram Frame D: Unit in in. (mm)

Frame E

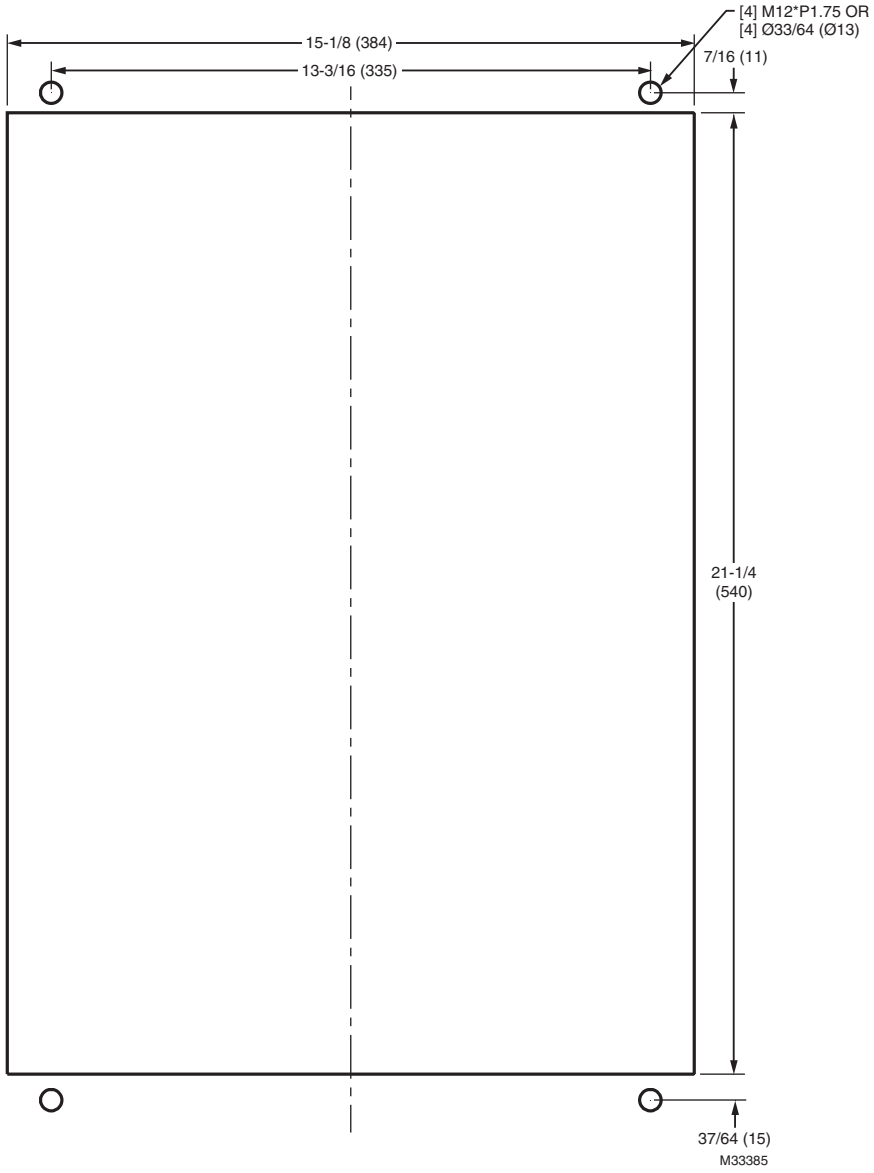
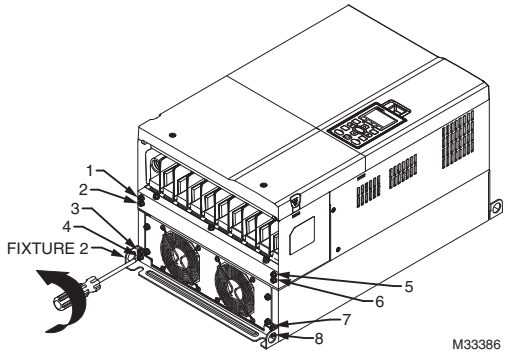


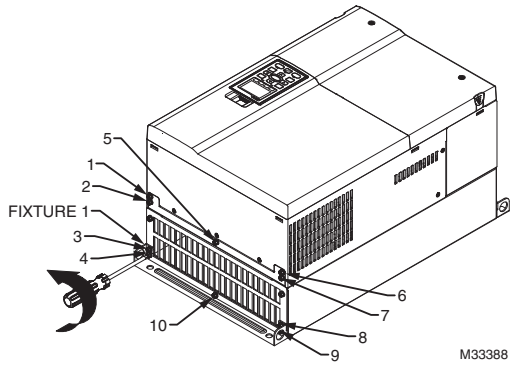
Fig. 6. Panel Cutout Diagram Frame E: Unit in in. (mm)

Installation of Flange Mounting Kit Frame D & E

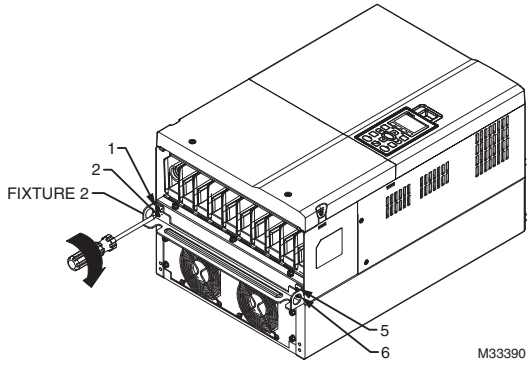
1. Remove 8 screws, then remove Fixture 2 (as shown in the following figure).



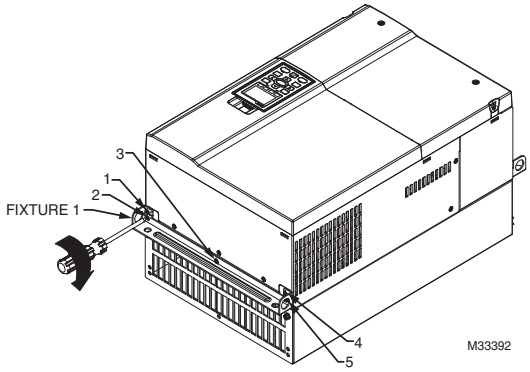
2. Remove 10 screws, then remove Fixture 1 (as shown in the figure below.)



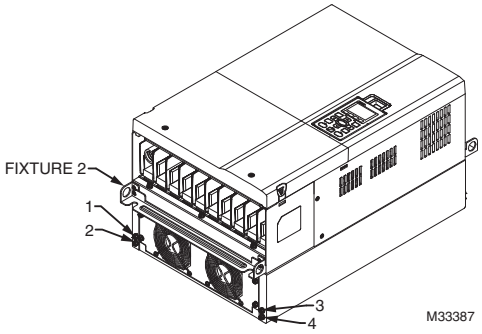
3. Tighten 4 screws (as shown in the figure below). Screw torque: 30~32kg-cm (26.0~27.8lb-in).



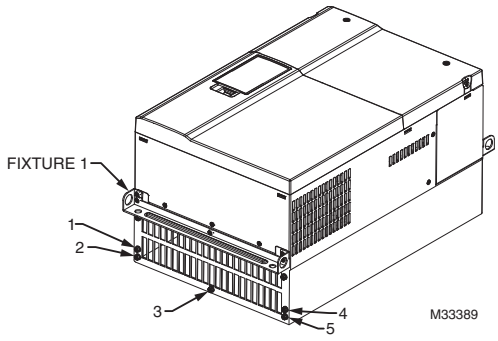
4. Tighten 5 screws (as shown in the figure below). Screw torque: 30~32kg-cm (26.0~27.8lb-in).



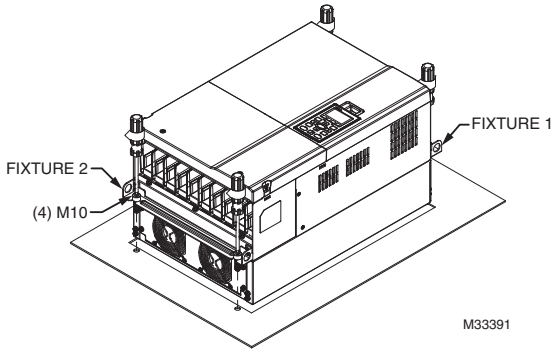
5. Tighten 4 screws (as shown in the following figure). Screw torque: 24~26kg-cm (20.8~22.6lb-in)



6. Tighten 5 screws (as shown in the figure below). Screw torque: 24~26kg-cm (20.8~22.6lb-in).



7. Place 4 screws (M10) through Fixture 1 & 2 and the plate then fasten the screws (as shown in the following figure). Screw torque: 200~240kg-cm (173.6~208.3lb-in).



CHAPTER 8

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CHAPTER 9: SPECIFICATIONS

Table 1. 230V Series

Frame size			**A**					**B**			**C**			**D**		**E**		
Model HCRDAxxxxx1000T			1hp	2hp	3hp	5hp	7.5hp	10hp	15hp	20hp	25hp	30hp	40hp	50hp	60hp	75hp	100hp	125hp
Output Rating	Normal "HVAC" Duty - Variable Torque	Rated Output Capacity (kVA)	2	3	4	6	8.4	12	18	24	30	36	42	58	72	86	110	128
		Rated Output Current (A)	5	7.5	10	15	21	31	46	61	75	90	105	146	180	215	276	322
		Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		Applicable Motor Output (HP)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125
		Overload tolerance	120% of rated current for 1 minute															
		Max. output frequency (Hz)	600.00Hz (55KW~: 400.00Hz)															
		Carrier Frequency (kHz)	2~15kHz (8KHz)								2~10kHz (6kHz)					2~9kHz (4KHz)		
	Heavy Duty - Constant Torque	Rated Output Capacity (kVA)	1.8	2	3.2	4.4	6.8	10	13	20	26	30	36	48	58	72	86	102
		Rated Output Current (A)	4.6	5	8	11	17	25	33	49	65	75	90	120	146	180	215	255
		Applicable Motor Output (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		Applicable Motor Output (HP)	0.5	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100
		Overload tolerance	120% of rated current for 1 minute, 160% of rated current for 3 seconds															
		Max. output frequency (Hz)	600.00Hz(55KW~: 400.00Hz)															
		Carrier Frequency (kHz)	2~15kHz (8KHz)								2~10kHz (6kHz)`					2~9kHz(4KHz)		
Input Rating	Input Current (A) Normal Duty		6.4	9.6	15	22	25	35	50	65	83	100	116	146	180	215	276	322
	Input Current (A) Heavy Duty		3.9	6.4	12	16	20	28	36	52	72	83	99	124	143	171	206	245
	Rated Voltage/Frequency		3-phase AC 200V~240V (-15% ~ +10%), 50/60Hz															
	Operating Voltage Range		170~265Vac															
	Frequency Tolerance		47~63Hz															
Cooling method			Natural Cooling	Fan Cooling														
Braking Chopper			Frame A,B,C: Built-in											Frame D and above: Optional				
DC choke			Frame A, B,C: Optional											Frame D and above: 3% built-in				
EMI Filter			Optional															

Table 2. 460V Series

Frame			**A**						**B**			**C**			**D**			
Models HCRDCxxxxx1000T			1hp	2hp	3hp	5hp	7.5hp	10hp	15hp	20hp	25hp	30hp	40hp	50hp	60hp	75hp	100hp	125hp
Output Rating	Normal "HVAC" Duty - Variable Torque	Rated Output Capacity (kVA)	2.4	2.9	4	6	9.6	11.2	18	24	29	36	45	57	73	88	115	143
		Rated Output Current (A)	3	3.7	5	7.5	12	14	22.5	30	36	45	56	72	91	110	144	180
		Applicable Motor Output (kW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		Applicable Motor Output (HP)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125
		Overload tolerance	120% of rated current for 1 minute															
		Max. output frequency (Hz)	600.00Hz (90KW~: 400.00Hz)															
		Carrier Frequency (kHz)	2~15kHz (8KHz)									2~10kHz (6kHz)						2~9 kHz (4KHz
	Heavy Duty - Constant Torque	Rated Output Capacity (kVA)	2.2	2.4	3.2	4.8	8.4	10	14	19	25	30	36	48	58	73	88	120
		Rated Output Current (A)	2.8	3	4	6	10.5	12	18	24	32	38	45	60	73	91	110	150
		Applicable Motor Output (kW)	0.4	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		Applicable Motor Output (HP)	0.5	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100
		Overload tolerance	120% of rated current for 1 minute;160% of rated current for 3 seconds															
		Max. output frequency (Hz)	600.00Hz(90KW~: 400.00Hz)															
		Carrier Frequency (kHz)	2~15kHz (8KHz)									2~10kHz (6kHz)						2~9 kHz (4KHz
Input Rating	Input Current (A) Normal Duty		4.3	5.4	7.4	11	18	20	25	33	39	47	58	76	91	110	144	180
	Input Current (A) Heavy Duty		3.5	4.3	5.9	8.7	15.5	17	20	26	35	40	47	63	74	101	114	157
	Rated Voltage/Frequency		3-phase AC 380V~480V (-15%~+10%), 50/60Hz															
	Operating Voltage Range		323~528Vac															
	Frequency Tolerance		47~63Hz															
Cooling method			Natural Cooling			Fan Cooling												
Braking Chopper			Frame A,B,C: Built-in												Frame D and above: Optional			
DC choke			Frame A, B,C: Optional												Frame D and above: 3% DC built-in			
EMI Filter			Frame A, B, C - EMI filter NOT built-in												Frame D and above: Optional			

Table 3. General Specifications

Control Characteristics	Control Method	1: V/F (V/F control); 2: SVC (Sensorless Vector Control)				
	Starting Torque	Reach up to 150% or above at 0.5Hz.				
	V/F Curve	4 point adjustable V/F curve and square curve				
	Speed Response Ability	5Hz				
	Torque Limit	Heavy Duty: Max.170% torque current				
	Torque Accuracy	±5%				
	Max. Output Frequency (Hz)	230V series: 600.00Hz (55kw and above: 400.00Hz);				
		460V series: 600.00Hz (90KW and above: 400.00Hz)				
	Frequency Output Accuracy	Digital command:±0.01%, -10C~+40C, Analog command: ±0.1%, 25±10C				
	Output Frequency Resolution	Digital command: 0.01Hz, Analog command: max. output frequency x 0.03/60 Hz (±11 bit)				
	Overload Tolerance	Normal duty: 120% of rated current for 1 minute				
		Heavy duty: 120% of rated current for 1 minute;160% of rated current for 3 seconds				
	Frequency Setting Signal	0~+10V, 4~20mA, 0~20mA, pulse input				
	Accel./Deccel. Time	0.00~600.00/0.0~6000.0 seconds				
	Main control function	Fault restart	Parameter copy	Dwell	BACnet COMM NOTE: BACnet is not available at the time of this printing, call technical support at 888-516-9347 for availability.	Momentary power loss ride thru
		Speed search	Over-torque detection	Torque limit	16 preset speed options	Accel/Deccel. time switch
		S-curve accel/ deccel	3-wire sequence	Auto-Tuning (rotational, stationary)	Frequency upper/lower limit settings	Cooling fan on/off switch
		Slip compensation	Torque compensation	JOG frequency	MODBus communication (RS-485 RJ45, max. 115.2 kbps)	DC injection braking at start/stop
		Smart Stall	PID control (with sleep function)	Energy saving control		
	Fan Control	**230V series**				
		Model HCRDA0200B1000T (20HP) and above are PWM controlled				
		Model HCRDA0150B1000T (15HP) and below are on/off switch controlled				
		460V series				
		Model HCRDC0200B1000T and above are PWM controlled				
		Model HCRDC0150B1000T (15HP) and below are on/off switch controlled				
Protection Characteristics	Motor Protection	Electronic thermal relay protection				
	Over-current Protection	Normal Duty: Over-current protection for 240% rated current				
		Current clamp Normal duty: 170~175%				
	Over-voltage Protection	230: drive will stop when DC-BUS voltage exceeds 410V				
		460: drive will stop when DC-BUS voltage exceeds 820V				
	Over-temperature Protection	Built-in temperature sensor				
	Stall Prevention	Stall prevention during acceleration, decceleration and running independently				
	Restart After Instantaneous Power Failure	Parameter setting up to 20 seconds				
	Grounding Leakage Current Protection	Leakage current is higher than 50% of rated current of the AC motor drive				
International Certifications		CE, GB 12668.3 c UL us				

Table 4. Environment for Operation, Storage and Transportation

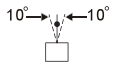
NOTE: DO NOT expose the VFD to an improper environment, such as dust, direct sunlight, corrosive/inflammable gases, humidity, liquid and vibration environment. The salt in the air must be less than 0.01mg/cm^2 every year.					
Environment	Installation location	IEC60364-1/IEC60664-1 Pollution degree 2, Indoor use only			
	Surrounding Temperature	Storage: -25^{o}C / -13^{o}F ~ +70^{o}C / 167^{o}F	Transportation: -25 ^{o}C / -13^{o}F ~ +70 ^{o}C / 167^{o}F		
		Non-condensation, non-frozen			
	Rated Humidity	Operation: Max. 90%	Storage/Transportation: Max. 95%		
		No condensing water			
	Air Pressure	Operation/ Storage: 86 to 106 kPa	Transportation: 70 to 106 kPa		
	Pollution Level	IEC721-3-3			
		Operation: Class 3C2; Class 3S2	Storage: Class 2C2; Class 2S2	Transportation: Class 1C2; Class 1S2	
		No concentrate			
	Altitude	Operation	If VFD is installed at altitude 0~1000m, follow normal operation restriction. If it is installed at altitude 1000~3000m, decrease 2% of rated current or lower 0.5^{o}C of temperature for every 100m increase in altitude. Maximum altitude for Corner Grounded is 2000m.		
Package Drop	Storage / Transportation	ISTA procedure 1A(according to weight) IEC60068-2-31			
Vibration	1.0mm, peak to peak value range from 2Hz to 13.2 Hz; 0.7G~1.0G range from 13.2Hz to 55Hz; 1.0G range from 55Hz to 512 Hz. Comply with IEC 60068-2-6				
Impact	IEC/EN 60068-2-27				
Operation Position	Max. allowed offset angle ±10^o (under normal installation position)				
Plenum Rating	Compliance with UL 508C, the Standard for Power Conversion Equipments, 3rd Edition, and the Canadian Standard for Industrial Control Equipment, C22.2-No. 14.				

Table 5. Specification for Operation Temperature and Protection Level

Model	Frame	Top cover	Conduit Box	Protection Level	Operation Temperature
HCRDAxxxxx1000T	Frame A-C 230V: 0.75-3kW	Remove top cover	Standard conduit plate	IP20/UL Open Type	-10-50^o C (14-120^o F)
		Standard with top cover		IP20/UL Type1/NEMA1	-10-40^o C (14-104^o F)
	Frame D-E 230V: Above 37kW	N/A	No conduit box	IP00 IP20/UL Open Type Only the circled area is IP00; other parts are IP20. 	-10-50^o C (14-122^o F)
HCRDCxxxxx1000T	Frame A-C 460V: 0.75~37kW	Remove top cover	Standard conduit plate	IP20/UL Open Type	-10-50^o C (14-122^o F)
		Standard with top cover		IP20/UL Type1/NEMA1	-10-40^o C (14-104^o F)
	Frame D-E 460V: Above 45kW	N/A	Standard conduit box	IP20/UL Type1/NEMA1	-10-40^o C (14-104^o F)

CHAPTER 10: DIGITAL KEYPAD

HCRDKEYPAD

M31501

Communication Interface
RJ-45 (socket)、RS-485 interface;

Installation Method
Embedded type and can be put flat on the surface of the control box. The front cover is water proof.

Charge the digital keypad for 6 minutes before you use it to program the VFD.

Table 1. Descriptions of Keypad Functions

Key	Descriptions
RUN	This is the RUN/START command to the VFD when in Hand/Keypad control only. It can operate the AC motor drive by the function setting and the RUN LED will be ON.
STOP RESET	Stop Command Key. This key has the highest processing priority in any situation. Drive will always STOP when this button is pressed. The RESET key can be used to reset the drive after the fault occurs. For those faults that can't be reset by the RESET key, see the fault records after pressing MENU key for details.
FWD REV	This key controls the operational direction of the motor. NOT activated out of the box.
ENTER	Press ENTER and go to the next submenu. If at the parameter level, press enter to modify and press enter to save changes
ESC	ESC key function is to leave current menu and return to the last menu. It is also functioned as a return key in the sub-menu.
MENU	Press menu to return to main menu. See main menu descriptions on following pages.

Table 1. Descriptions of Keypad Functions

	RIGHT and LEFT arrows to move the cursor with a numeric parameter, or to enter into and out of menus.
	UP and DOWN arrows used to change numeric parameter values, or cycle through menu options.
	Function Keys - will have different functions at different times as displayed on the screen. Used during Wizard Mode.
	Pressing the HAND key will take the VFD into Hand control, where the user can control the motor Frequency and START and STOP.
	Pressing this key will revert the VFD to remote/Automatic control from a remote speed and start command source.

Table 2. Descriptions of LED Functions

LED	Descriptions
	Steady ON: operation indicator for the VFD, including DC brake, zero speed, standby, restart after fault and speed search.
	Blinking: VFD is decelerating to stop.
	Steady OFF: VFD is not running.
	Steady ON: VFD is stopped.
	Blinking: VFD is in the standby status.
	Steady OFF: VFD running.
	Operation Direction LED (green: forward running, red: reverse running).
	Blinking: drive is changing the operation direction.
	HAND LED: HAND LED is on (HAND mode); HAND LED is off (AUTO mode).
	AUTO LED: AUTO LED is on (AUTO mode); AUTO LED is off (HAND mode).

Startup in Digital Keypad

1. The default Start-up page is Honeywell Logo, displayed for 3 seconds
2. Selection Screen. Choose how to interact with the VFD.
   - Press F4: Runs the Startup Wizard
   - Press Menu: Redirect to the main menu
   - Press Esc: Redirect to the monitor screen

Startup Wizard Guide

Follow the steps in the table below to complete the Startup Wizard.

Table 3. Honeywell Commissioning Start-Up Wizard

Screen #	Screen Verbiage	Screen Description	Screen options
1	Boot Screen	Honeywell displayed for 3 seconds	N/A
2	Selection Screen	Choose how to interact with the VFD: Recommendation: Press function key F4 to start the wizard	F4: Runs the START UP WIZARD Menu: redirects to MAIN MENU ESC: redirects to MONITOR Screen
3	Select Language	Choose the keypad programming language Use UP and DOWN arrows to change from default. Press ENTER to accept change. F1 BACK up one menu (SAME function throughout WIZARD) F4 Next Parameter (SAME function throughout WIZARD)	1. English (Default) 2. Spanish 3. Chinese 4. Portuguese 5. French Use arrow keys to adjust. Press ENTER to save changes, F4 to advance without changes.
4	Clock Time and DATE	Select the time (Military) HH:MM:SS and date YY/MM/DD	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes.
5	Motor Voltage	Motor's rated voltage based upon Motor Name Plate data	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes. The default motor voltage is based on the VFD voltage that you have selected
6	Motor Current	Full Load AMPs (FLA)Do not use the motor service factor amperage for this value.	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes.
7	Motor FREQ	Motor's rated frequency based upon Motor Name Plate data	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes.
8	Motor RPM	Motor's rated RPM based upon Motor Name Plate data	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes.
9	ACCEL TIME	The time required to accelerate from the motor's current speed reference to a new speed reference	Acceleration time is factory set for typical Fan and Pump needs. Use arrow keys to adjust. Press ENTER to save changes, F4 to advance without changes.
10	DECEL TIME	The time required to decelerate from the motor's current speed reference to a new speed reference	Decceleration time is factory set for typical Fan and Pump needs. Use arrow keys to adjust. Press ENTER to save changes, F4 to advance without changes.
11, 12, 13	PRESET SPEED 1,2,3	Present Speed options. On digital input closure the VFD will ignore the speed reference from the analog input and will run at the programmed speed.	With the use of MFI (Multifunction inputs) 1, 2, or 3 the drive can be sent to the programmed speed on digital input closure (Usage not required in the field). Use arrow keys to adjust if needed. Press ENTER to save changes, F4 to accept factory defaults.
14	Analog Input	Select the speed reference signal type.	0. 0-10V - Use AVI (Analog Voltage Input terminal) 1. 4-20mA - Use ACI (Analog current input terminals) 2. 2-10V - Use AVI 3. 0-20mA - Use ACI
15	MIN Frequency	The minimum frequency at which the motor will operate	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes.
16	MAX Frequency	The maximum frequency at which the motor will operate	Press F4 to accept factory defaults. Use arrow keys to adjust if needed. PRESS ENTER to save changes.
17	PRESS F4 to SAVE ALL	Saves all parameter updates - VFD is ready to operate	F1 will escape the user back to the Selection Screen again F4 will save parameters and take the user to the display screen

Menu Structure

Table 4. Main Menu Structure.
NOTE: This menu is accessed when the MENU button is pressed.

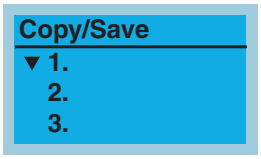
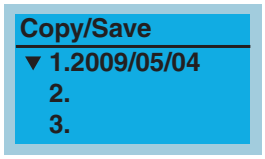
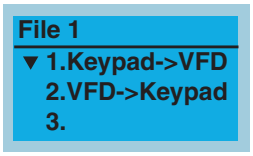
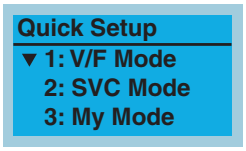
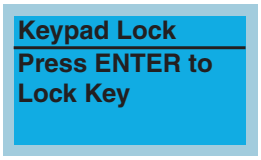
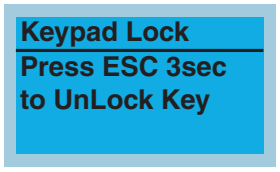
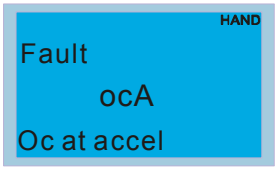
Start Wizard	Restart the Start-up Wizard: See Wizard instructions
Copy/Save	1. Copy Parameters (4 parameter copies can be stored per keypad) 2. Press Enter on row 1-4, then select save to save parameters or load to upload parameters to the VFD from the saved parameter list.   
Fault Record 	1. Records the last 6 fault records 2. The first fault is the current or most recent fault 3. Select the fault code for time, date, frequency output, current, voltage, and DC Bus Voltage at time of fault 4. Press ENTER to view a particular fault and scroll UP and DOWN to see data
Time Setup 	Enter time setup; “9” will continue to blink  Move to left / right  Increase / decrease the value When done, press  to confirm.
Quick Setup 	Quick Settings Menu contains a list of optional parameter lists for different applications. MY MODE, where frequency used parameters can be saved is located here. STARTUP WIZARD parameters are also listed in this menu.
Keypad Lock 	The keypad is locked when ENTER is pressed. When any key is pressed the following screen will appear.  To unlock, hold the ESC key down for 3 seconds. Press ENTER when done.
Language	Use the arrow key to move up and down to change the language selection
Display Setup 	Display Setup Menu allows the user to adjust the backlight time and contract. UP and DOWN arrows are used to adjust settings. ENTER must be pressed for changes to be saved.
Advanced Parameters	Full Parameter list setup. Refer to the full parameters in Chapter 12 or at http://www.customer.honeywell.com
Splash Screen	Refer to the full parameters in Chapter 12

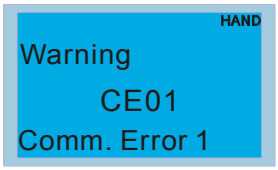
Table 4. Main Menu Structure.
NOTE: This menu is accessed when the MENU button is pressed.

Main Page	Refer to the full parameters in Chapter 12
PLC Enabled	Refer to the full parameters in Chapter 12
Copy PLC	Refer to the full parameters in Chapter 12
PC Link	Refer to the full parameters in Chapter 12

Other display

When a fault occurs, the menu will display:





1. Press ENTER and start RESET. If still no response, please contact Honeywell Technical Support or return to the factory. To view the fault DC BUS voltage, output current and output voltage, press “MENU”à“Fault Record”.
2. Press ENTER again, if the screen returns to main page, the fault is clear.
3. When fault or warning message appears, backlight LED will blinks until the fault or the warning is cleared.

Optional accessory for digital keypad: RJ45 Extension Lead

Cable	Description
Cable 7	RJ45 Extension Lead 7 feet
Cable 15	RJ45 Extension Lead 15 feet

NOTES:
1. Keypad supports up to 4 main pages. If you download over 4 main pages, it will only support the first 4 downloaded main pages.
2. By pressing keypads, you can only switch pages from pates. It doesn’t support entering words or images.
3. Downloading baud rate supports 9600 bps, 19200 bps and 38400 bps.
4. The VFD communication address to read and write are at 0x22xx

Table 5. Definition of Communication Address

Address	Read/Write	Definition		Description
2200h	R	b15~b0	Output current (A)	
2201h	R	b15~b0	Counter Value (c)	
2202h	R	b15~b0	Actual Frequency (H)	
2203h	R	b15~b0	DC-Bus Voltage (U)	
2204h	R	b15~b0	Output Voltage(A)	
2205h	R	b15~b0	Power Factor Angle (n)	
2206h	R	b15~b0	Output Power(P)	
2207h	R	b15~b0	Actual Motor Speed(r)	
2208h	R	b15~b0	Output Torque (t)	
2209h	R	b15~b0	PG Position (G)	
220Ah	R	b15~b0	Feedback PV value (b)	
220Bh	R	b15~b0	AVI in percentage (1.)	

Table 5. Definition of Communication Address

220Ch	R	b15~b0	ACI in percentage (2.)	
220Dh	R	b15~b0	AUI in percentage (3.)	
220Eh	R	b15~b0	Heat Sink temperature (t.)	
220Fh	R	b15~b0	IBGT temperature (T)	
2210h	R	b15~b0	DI ON/OFF status (i)	
2211h	R	b15~b0	DO ON/OFF status (o)	
2212h	R	b15~b0	Multi-Speed (S)	
2213h	R	b15~b0	DI CPU pin status (i.)	
2214h	R	b15~b0	DO CPU pin status (o.)	
2215h	R	b15~b0	Running number of Encoder (Z)	
2216h	R	b15~b0	Pulse Input Frequency (4)	
2217h	R	b15~b0	Pulse Input Position (4.)	

CHAPTER 11: SUMMARIES OF PARAMETER SETTINGS

System Parameters

NOTE: IM: Induction Motor; PM: Permanent Magnet Motor

Table 1. System Parameters

Parameter	Function	Setting	Factory Setting
00-00	ID Code of the VFD	4: 230V, 1HP (0.75kW) 5: 460 V, 1HP (0.75kW) 6: 230V, 2HP (1.5kW) 7: 460 V, 2HP (1.5kW) 8: 230V, 3HP (2.2kW) 9: 460 V, 3HP (2.2kW) 10: 230V, 5HP (3.7kW) 11: 460 V, 5HP (3.7kW) 12: 230V, 7.5HP (5.5kW) 13: 460 V, 7.5HP (5.5kW) 14: 230V, 10HP (7.5kW) 15: 460V, 10HP (7.5kW) 16: 230V, 15HP (11kW) 17: 460V, 15HP (11kW) 18: 230V, 20HP (15kW) 19: 460V, 20HP (15kW) 20: 230V, 25HP (18.5kW) 21: 460V, 25HP (18.5kW) 22: 230V, 30HP (22kW) 23: 460V, 30HP (22kW) 24: 230V, 40HP (30kW) 25: 460V, 40HP (30kW) 26: 230V, 50HP (37kW) 27: 460V, 50HP (37kW) 28: 230V, 60HP (45kW) 29: 460V, 60HP (45kW) 30: 230V, 75HP (55kW) 31: 460V, 75HP (55kW) 32: 230V, 100HP (75kW) 33: 460V, 100HP (75kW) 34: 230V, 125HP(90kW) 35: 460V, 125HP (90kW) 37: 460V, 150HP (110kW) 39: 460V, 175HP(132kW) 41: 460V, 215HP(160kW) 43: 460V, 250HP(185kW) 45: 460V, 300HP(220kW) 47: 460V, 375HP(280kW) 49: 460V, 425HP(315kW) 51: 460V, 475HP(355kW) 53: 460V, 536HP(400kW) 93: 460V, 5.5HP (4.0kW)	Read Only
00-01	Display VFD Rated Current	Display by models	Read Only

	Parameter	Function	Setting	Factory Setting
	00-02	Parameter Reset	0: No function 1: Read only 6: Reset PLC (including CANopen Master Index) 7: Reset CANopen Index (Slave) 9: All parameters are reset to factory settings(base frequency is 50Hz) 10: All parameters are reset to factory settings (base frequency is 60Hz)	0
✓	00-03	Start-up Display Selection	0: F (frequency command) 1: H (output frequency) 2: U (multi-function display, see Pr.00-04) 3: A (output current)	0
✓	00-04	Content of Multi-function Display (User Defined)	0: Display output current (A) 1: Display counter value (c) 2: Display actual output frequency (H.) 3: Display DC-BUS voltage (v) 4: Display output voltage (E) 5: Display output power angle (n) 6: Display output power in kW (P) 8: Display estimate output torque % (t) 10: Display PID feedback in % (b) 11: Display AVI1 in % (1.) 12: Display ACI in % (2.) 13: Display AVI2 in % (3.) 14: Display the temperature of IGBT in °C (i.) 15: Display the temperature of heat sink in °C (c.) 16: The status of digital input (ON/OFF) (i) 17: The status of digital output (ON/OFF) (o) 18: Multi-step speed (S) 19: The corresponding CPU pin status of digital input (d.) 20: The corresponding CPU pin status of digital output (0.) 25: Overload counting (0.00~100.00%) (h.) 26: Ground Fault GFF (Unit :%)(G.) 27: DC Bus voltage ripple (Unit: Vdc) (r.) 28: Display PLC data D1043 (C) 30: Display output of user defined (U) 31: H page x Pr.00-05 Display user Gain(K)	0
	00-05	Coefficient Gain in Actual Output Frequency	0~160.00	0
	00-06	Software version	0.00~65535	Read Only
✓	00-07	Parameter Protection Password Input	0~65535 0~4 : Recording # of times of password attemps	0
✓	00-08	Parameter Protection Password Setting	0~65535 0 : No password protection / password is entered correctly (Pr00-07) 1 : Parameter is locked	0
✓	00-09	Display advanced parameters	Bit 0: Group 0 Bit 1: Group 1 Bit 2: Group 2 Bit 3: Group 3 Bit 4: Group 4 Bit 5: Group 5 Bit 6: Group 6 Bit 7: Group 7 Bit 8: Group 8 Bit 9: Group 9	0
	00-10	Velocity Control Mode	0 : VF (V/F control) 2 : SVC (Sensor-Less Vector Control)	0
✓	00-11	Loading mode selection	0 : Normal duty 1 : Heavy duty	0

	Parameter	Function	Setting			Factory Setting
	00-12	Carrier Frequency (KHz)	2~15kHz	230V	Normal duty: 1~20hp	8
					Heavy duty: 0.5~15HP	
				460V	Normal duty: 1~25hp	
					Heavy duty: 0.5~20HP	
			2~10kHz	230V	Normal duty: 25~60hp	6
					Heavy duty: 20~50hp	
				460V	Normal duty: 30~100hp	
					Heavy duty: 25~75hp	
			2~9kHz	230V	Normal duty: 75~125hp	4
					Heavy duty: 60~100hp	
				460V	Normal duty: 125~536hp	
					Heavy duty: 100~475hp	
	00-13	PLC command mask (SOOC, SOOF)	0~65535			0 Read Only
✓	00-14	Source of the MASTER Frequency Command (AUTO)	0: Digital keypad 1: RS-485 serial communication 2: External analog input (Pr.03-00) 3: External UP/DOWN terminal 6: CANopen communication card 8: Communication card (no CANopen card)			2
✓	00-15	Source of the Opertaion Command (AUTO)	0: Digital keypad 1: External analog input (Pr.03-00) 2: RS-485 serial communication 3: External UP/DOWN terminal 5: Communication card (not included CANopen card)			1
✓	00-16	Stop method	0: Ramp to stop 1: Coast to stop			1
✓	00-17	Motor Operating Direction Control	0: Enable forward/reverse 1: Reverse disable 2: Forward disable			1
✓	00-18	Memory of Communication Frequency Command	Read Only			Read Only
	00-19	User Defined Property	Bit 0~3: user defined on decimal places 0000b: no decimal place 0001b: one decimal place 0010b: two decimal place 0011b: three decimal place Bit 4~15: user define on unit 000xh: Hz 001xh: rpm 002xh: % 003xh:kg			**0**
	00-20	Max. User Defined Value	0: Disable 0000b: 0~65535 (No decimal place in Pr.00-19 setting) 0001b: 0.0~6553.5 (One decimal place in Pr.00-19 setting) 0010b: 0.0~655.35(Two decimal place in Pr.00-19 setting) 0011b: 0.0~65.536 (Three decimal place in Pr.00-19 setting)			**0**

	Parameter	Function	Setting	Factory Setting
	00-21	User Defined Value	Read Only	Read Only
	00-22	Local / Remote Selection	0: Standard HOA 1: LOC/REM not maintain 2: REM maintain 3: LOC maintain 4: LOC/REM maintain	0
↗	00-23	Source of the Master Frequency Command (HAND)	0: Digital keypad 1: RS-485 serial communication 2: External analog input (Pr.03-00) 3: External UP/DOWN terminal 6: CANopen communication card 8: Communication card (no CANopen card)	0
↗	00-24	Source of the Operation Command (HAND)	0: Digital keypad 1: External terminals. Keypad STOP disabled. 2: RS-485 serial communication. Keypad STOP disabled. 3: CANopen communication card 5: Communication card (not include CANopen card)	0
	00-25	Digital Keypad STOP Function	0: STOP key disable 1: STOP key enable	1
	00-26	Display Filter Time (Current)	0.001~65.535	0.100
	00-27	Display Filter Time (Keypad)	0.001~65.535	0.100
	00-28	Software Version (Date Code)	0~65535	Read Only

Basic Parameter

Table 2. Basic Parameter

	Parameter	Explanation	Settings	Factory Setting
	01-00	Max. Operating Frequency (Hz)	50.00~600.00Hz	60.00
	01-01	Motor1: Max Output Frequency(Hz)	0.00~600.00Hz	60.00
	01-02	Motor1: Max Output Voltage (V)	230V: 0.0V~255.0V 460V: 0.0V~510.0V	230.0 460.0
	01-03	Mid-point Frequency 1 of Motor 1	0.00~600.00Hz	3.0
✓	01-04	Mid-point Voltage 1 of Motor 1	230V: 0.0V~240.0V 460V: 0.0V~480.0V	11.0 22.0
	01-05	Mid-point Frequency 2 of Motor 1	0.00~600.00Hz	0.50
✓	01-06	Mid-point Voltage 2 of Motor 1	230V: 0.0V~240.0V 460V: 0.0V~480.0V	2.0 8.0
	01-07	Min. Output Frequency of Motor 1	0.00~600.00Hz	0.00
✓	01-08	Min. Output Voltage of Motor 1	230V: 0.0V~240.0V 460V: 0.0V~480.0V	0.0 0.0
	01-09	Start-Up Frequency	0.00~600.00Hz	0.50
✓	01-10	Output Frequency Upper Limit	0.00~600.00Hz	62.00
✓	01-11	Output Frequency Lower Limit	0.00~600.00Hz	20.00
✓	01-12	Accel. Time 1	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	Frame A,B,C: 30.00 Frame D,E: 60.00
✓	01-13	Decel. Time 1	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	30.00 10.0
✓	01-14	Accel. Time 2	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-15	Decel. Time 2	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-16	Accel. Time 3	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-17	Decel. Time 3	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-18	Accel. Time 4	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-19	Decel. Time 4	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-20	JOG Acceleration Time	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-21	JOG Deceleration Time	Pr.01-37=0: 0.00~600.00 second Pr.01-37=1: 0.0~6000.0 second	10.00 10.0
✓	01-22	JOG Frequency	0.00~600.00Hz	6.00
✓	01-23	Frequency of 1st Acceleration / Deceleration & Frequency of 4th Acceleration / Deceleration.	0.00~600.00Hz	0.00
✓	01-24	S-curve Time 1	Pr.01-37=0: 0.00~25.00 second Pr.01-37=1: 0.0~250.0 second	0.20 0.20

Table 2. Basic Parameter

	Parameter	Explanation	Settings	Factory Setting
↗	01-25	S-curve Time 2	Pr.01-37=0: 0.00~25.00 second Pr.01-37=1: 0.0~250.0 second	0.20 0.20
↗	01-26	S-curve Time 3	Pr.01-37=0: 0.00~25.00 second Pr.01-37=1: 0.0~250.0 second	0.20 0.20
↗	01-27	S-curve Time 4	Pr.01-37=0: 0.00~25.00 second Pr.01-37=1: 0.0~250.0 second	0.20 0.20
	01-28	Skip Frequency 1 Upper Limit	0.00~600.00Hz	0.00
	01-29	Skip Frequency 1 Lower Limit	0.00~600.00Hz	0.00
	01-30	Skip Frequency 2 Upper Limit	0.00~600.00Hz	0.00
	01-31	Skip Frequency 2 Lower Limit	0.00~600.00Hz	0.00
	01-32	Skip Frequency 3 Upper Limit	0.00~600.00Hz	0.00
	01-33	Skip Frequency 3 Lower Limit	0.00~600.00Hz	0.00
	01-34	Zero-speed Mode	0: Output waiting 1: Zero-speed operation 2: Output at Minimum Frequency (the 4th output frequency)	0
	01-35	V/f Curve Selection	0: normal V/F curve 1: Curve to the power of 1.5 2: Curve to the power of 2	2
↗	01-36	Optimal Acceleration/Deceleration Setting	0: Linear accel. /decel. 1: Auto accel., Linear decel. 2: Linear accel., Auto decel. 3: Auto accel. / decel. 4: Linear, stall prevention by auto accel./decel. (limit by Pr.01-12 to 01-21)	0
	01-37	Time Unit for Accel. /Decel. and S Curve	0: Unit: 0.01 sec 1: Unit: 0.1sec	0

Digital Input/Output Parameters

Table 3. Digital Input/Output Parameters

Parameter	Explanation	Settings	Factory Setting
02-00	2-wire/3-wire Operation Control	0: 2-wire mode, power on for operation control 1: 2-wire mode 2, power on for operation control 2: 3-wire, power on for operation control	1

Parameter	Explanation	Settings	Factory Setting
02-01	Multi-function Input Command 1 (MI1)	0: No function 1: Multi-step speed command 1 2: Multi-step speed command 2 3: Multi-step speed command 3 4: Multi-step speed command 4 5: Reset 6: JOG command: by external control 7: Acceleration/deceleration speed inhibit 8: The 1st, 2nd acceleration/deceleration time selection 9: The 3rd, 4th acceleration/deceleration time selection 10: EF Input (Pr.07-19) 11: B.B input from external (Base Block) 12: Output stop 13: Cancel the setting of optimal accel. /decel. time 14: Switch between motor 1 and motor 2 15: Operation speed command from AVI1 16: Operation speed command from ACI 17: Operation speed command from AVI2 18: Emergency stop (Pr.07-19) 19: Digital up command 20: Digital down command 21: PID function disabled 22: Clear counter 23: Input the counter value (MI6) 24: FWD JOG command 25: REV JOG command 28: Emergency stop (EF1) 29: Signal confirmation for Y-connection 30: Signal confirmation for D-connection 38: Disable EEPROM write function 40: Force coast to stop 41: HAND switch 42: AUTO switch 44~47: Reserved 49: Drive enable 51: Selection for PLC mode bit0 52: Selection for PLC mode bit1 53: Trigger CANopen quick stop 54: UVW Magnetic Contactor On/Off 55: Brake Released Signal 56: Local/Remote Selection 57: Max Forward Disabled 58: Enable fire mode (with RUN Command) 59: Enable fire mode (without RUN Command) 60: All motors disabled 61: Motor#1 disabled 62: Motor#2 disabled 63: Motor#3 disabled 64: Motor#4 disabled 65: Motor #5 disabled 66: Motor#6 disabled 67: Motor#7 disabled 68: Motor#8 disabled 69~70: Disabled	1
02-02	Multi-function Input Command 2 (MI2)		2
02-03	Multi-function Input Command 3 (MI3)		3
02-04	Multi-function Input Command 4 (MI4)		4
02-05	Multi-function Input Command 5 (MI5)		28
02-06	Multi-function Input Command 6 (MI6)		5
02-07	Multi-function Input Command 7 (MI7)		59
02-08	Multi-function Input Command 8 (MI8)		0
02-24	Input terminal of I/O extension card (MI9)		0
02-25	Input terminal of I/O extension card (MI10)		0
02-26	Input terminal of I/O extension card (MI12)		0
02-27	Input terminal of I/O extension card (MI12)		0
02-28	Input terminal of I/O extension card (MI13)		0
02-29	Input terminal of I/O extension card (MI14)		0
✓ 02-09	UP/DOWN key mode	0: up/down by the accel. /decel. time 1: up/down constant speed (Pr.02-10)	0
✓ 02-10	Constant speed. The Accel. /Decel. Speed of the UP/DOWN Key	0.01~1.00Hz/ms	0.01

	Parameter	Explanation	Settings	Factory Setting
✓	02-11	Multi-function Input Response Time	0.000~30.000 seconds	0.005
✓	02-12	Multi-function Input Mode Selection	0~65535, 0: N.O., 1: N.C., error	0
✓	02-13	RLY1: Multi Output Terminal	0: No function	11
✓	02-14	RLY2: Multi Output Terminal	1: Operation Indication	1
✓	02-15	RLY3: Multi Output Terminal	2: Operation speed attained	9
✓	**02-34**	Expansion Card Output Terminal (MO3)	4: Desired frequency attained 2 (Pr.02-22)	0
✓	**02-35**	Expansion Card Output Terminal (MO4)	5: Zero speed (Frequency command)	0
✓	**02-36**	Expansion Card Output Terminal (MO5)	6: Zero speed, include STOP(Frequency command)	0
✓	**02-37**	Output terminal of the I/O extension card (MO6)	7: Over torque 1 8: Over torque 2	0
✓	**02-38**	Output terminal of the I/O extension card (MO7)	9: Drive is ready 10: Low voltage warning (LV): (Pr.06-00)	0
✓	**02-39**	Output terminal of the I/O extension card (MO8)	11: Malfunction indication 12: Mechanical brake release (Pr.02-30)	0
✓	**02-40**	Output terminal of the I/O extension card (MO9)	13: Overheat warning (Pr.06-14) 14: Software brake signal indication (Pr.07-00)	0
✓	**02-41**	Output terminal of the I/O extension card (MO10)	15: PID feedback error 16: Slip error (oSL)	0
✓	**02-42**	Output terminal of the I/O extension card (MO11)	17: Terminal count value attained, does not return to 0 (Pr.02-18)	0
	02-43	Output terminal of the I/O extension card (MO12)	18: Preliminary count value attained, returns to 0 (Pr.02-17)	0
✓ ✓	**02-44**	Output terminal of the I/O extension card (MO13)	19: Base mask 20: Warning output 21: Over voltage warning 22: Over-current stall prevention warning 23: Over-voltage stall prevention warning 24: Operation mode indication 25: Forward command 26: Reverse command 27: Output when current >= Pr.02-31 (>= 02-31) 28: Output when current <=Pr.02-31 (<= 02-31) 29: Output when frequency >= Pr.02-32 (>= 02-32) 30: Output when frequency <= Pr.02-32 (<= 02-32) 31: Y-connection for the motor coil 32: D-connection for the motor coil 33: Zero speed (actual output frequency) 34: Zero speed include stop(actual output frequency) 35: Error output selection 1(Pr.06-22) 36: Error output selection 2(Pr.06-23) 37: Error output selection 3(Pr.06-24) 38: Error output selection 4(Pr.06-25) 40: Speed attained (including Stop) 44: Low current output 45: UVW Magnetic Contactor enabled 47: Brake output closed 50: Output for CANopen control 51: Output for RS485 52: Output for communication card 53: Fire mode indication 54: Bypass fire mode indication 55: Motor #1 Output 56: Motor #2 Output 57: Motor #3 Output 58: Motor#4 Output 59: Motor#5 Output 60: Motor #6 Output 61: Motor#7 Output 62: Motor#8 Output	0
✓	02-16	Multi-function output direction	0~65535, 0: N.O., 1: N.C.	0
✓	02-17	Terminal counting value attained	0~65500	0

	Parameter	Explanation	Settings	Factory Setting
✓	02-18	Preliminary counting value attained (not return to 0)	0~65500	0
✓	02-19	Digital Output Gain (DFM)	1~166	1
✓	02-20	Desired Frequency Attained 1	0.00~600.00Hz	60.00/ 50.00
✓	02-21	The Width of the Desired Frequency Attained 1	0.00~600.00Hz	2.00
✓	02-22	Desired Frequency Attained 2	0.00~600.00Hz	60.00/ 50.00
✓	02-23	The Width of the Desired Frequency Attained 2	0.00~600.00Hz	2.00
	02-30	Brake Delay Time	0.000~65.000	0.000
✓	**02-31**	Output Current Level Setting for Multi-function External Terminals	0~100%	0
✓	**02-32**	Output frequency setting for multi-function output terminal	0.00~600.00Hz	0.00
✓	**02-33**	External Operation Control Selection after Reset and Activate	0: Disabled 1: Drive runs if run command exists after reset	1
✓	02-45	Max. Frequency of Resolution Switch	0.01~600.00Hz	60.00
✓	02-46	Switch the delay time of Max. output frequency	0.000~65.000 seconds	0.000
✓	02-47	Status of Multi-function Input Terminal	Monitor the status of multi-function input terminals	Read Only
✓	02-48	Status of Multi-function Output Terminal	Monitor the status of multi-function output terminals	Read Only
	02-49	Display External Output terminal occupied by PLC	Monitor the status of PLC input terminals	Read Only
	02-50	Display Analog Input Terminal occupied by PLC	Monitor the status of PLC output terminals	Read Only
	02-51	Display the Frequency Command Memory of External Terminal	Read Only	Read Only
	02-52	Mix active by Internal or External Selection	0~65535	0
	02-53	Internal Mix active value	0~65535	0

Analog Input/Output Parameter

Table 4. Analog Input/Output Parameter

	Parameter	Explanation	Settings	Factory Setting
✓	03-00	Analog Input 1 (AVI1)	0: No function 1: Frequency command 4: PID target value 5: PID feedback signal 6: PTC thermistor input value 11: PT100 thermistor input value 12~17: Reserved	03-00:1
✓	03-01	Analog Input 2(ACI)		03-01:0
✓	03-02	Analog Input 3 (AVI2)		03-02:0
✓	03-03	AVI1 Analog Input Bias	-100.0~100.0%	0
✓	03-04	ACI Analog Input Bias	-100.0~100.0%	0
✓	03-05	AVI2 Voltage Input Bias	-100.0~100.0%	0
✓	03-06	AVI1 bias mode	0: No bias 1: Lower than bias=bias 2: Greater than bias=bias 3: The absolute value of the bias voltage while serving as the center 4: Serve bias as the center	0
✓	03-07	ACI bias mode		
✓	03-08	AVI2 positive/negative bias mode		
✓	03-09	Analog Input Gain 1 (AVI1)	-500.0~500.0%	100.0
✓	03-10	Analog Input Gain 2 (ACI)	-500.0~500.0%	100.0
✓	03-11	Analog Positive Input Gain 3 (AVI2)	-500.0~500.0%	100.0
✓	03-12	Analog Input Filter Time (AVI1)	0.00~20.00 seconds	0.01
✓	03-13	Analog Input Filter Time (ACI)	0.00~20.00 seconds	0.01
✓	03-14	Analog Input Filter Time (AVI2)	0.00~20.00 seconds	0.01
✓	03-15	Addition Function of the Analog Input	0: Disable addition function (AVI1, ACI, AVI2) 1: Enable addition function	0
✓	03-16	Loss of the ACI Signal	0: Disable 1: Continue operation at the last frequency 2: Decelerate to 0Hz 3: Stop immediately and display ACE	0
✓	03-17	Multi-function Output 1 (AFM1)	0: Output frequency (Hz) 1: Frequency command (Hz) 2: Motor speed (Hz) 3: Output current (rms) 4: Output voltage 5: DC Bus Voltage 6: Power factor 7: Power 8: Output torque 9: AVI1 % 10: ACI % 22: Analog output for communication card 23: Constant voltage output	0
	03-18	Gain for Analog Output 1 (AFM1)	0~500.0%	100
	03-19	Analog Output 1 Value in REV Direction (AFM1)	0: Absolute output voltage 1: Reverse output 0V; Positive output 0-10V 2: Reverse output 5-0V; Positive output 5-10V	0

Table 4. Analog Input/Output Parameter

	Parameter	Explanation	Settings	Factory Setting
↗	03-20	Multi-function Output 2 (AFM2)	1: Frequency command (Hz) 2: Motor speed (Hz) 3: Output current (rms) 4: Output voltage 5: DC Bus voltage 6: Power factor 7: Power 9: AVI1 % 10: ACI % 11: AVI2 % 20: CANopen analog output 22: Communication card analog output 23: Constant voltage output	2
↗	03-21	Gain for Analog Output 2 (AFM2)	0~500.0%	100
↗	03-22	Analog Output 2 Value in REV Direction (AFM2)	0: Absolute output voltage 1: Output 0V in REV direction; output 0-10V in FWD direction 2: Output 5-0V in REV direction; output 5-10V in FWD direction	0
↗	03-23	Display Low pass Filter (AFM1)	0.001~65.535 seconds	0
↗	03-24	Display Low pass Filter (AFM2)	0.001~65.535 seconds	0
↗	03-25	AVI1 Selection	0: 0-10V 1: 0-20mA 2: 4-20mA	0
↗	03-26	ACI Selection	0: 4-20mA 1: 0-10V 2: 0-20mA	0
↗	03-27	Status of PLC Output Terminal	Monitor the status of PLC output terminals	Read Only
	03-28	AFM2 0-20mA Output Selection	0: 0-20mA 1: 4-20mA	0
	03-29	AFM1 DC output setting level	0.00~100.00%	0.00
	03-30	AFM2 DC Output Setting Level	0.00~100.00%	0.00
	03-31	AFM1 0-20mA/4-20mA selection	0: 0~20mA 2:4-20mA	0
	03-32	AI calculated selection	0~7	7
	03-33	AVI Point1 – voltage	0.00 ~ 10.00 / 0.00~20.00	0.00
	03-34	AVI Point 1- Hz	0.00 ~ 600.00Hz	20.00
	03-35	AVI Point 2- V/mA	0.00 ~ 10.00 / 0.00 ~ 20.00	10.00/20.00
	03-36	AVI Point2- Hz	0.00 ~ 600.00Hz	60.00
	03-37	AVI Point 3 – V/mA	0.00 ~ 10.00 / 0.00 ~ 20.00	10.00/20.00
	03-38	AVI Point 3- Hz	0.00 ~ 600.00Hz	60
	03-39	ACI Point 1 – V/mA	0.00 ~ 10.00 / 0.00 ~ 20.00	0.00/4.00

Table 4. Analog Input/Output Parameter

Parameter	Explanation	Settings	Factory Setting
03-40	ACI Point 1- Hz	0.00 ~ 600.00Hz	20.00
03-41	ACI Point 2 – V/mA	0.00 ~ 10.00 / 0.00~20.00	10.00/20.00
03-42	ACI Point2 - Hz	0.00 ~ 600.00 Hz	60.00
03-43	ACI Point 3 – V/mA	0.00 ~ 10.00 / 0.00~20.00	10.00/20.00
03-44	ACI Point3 - percent	0.00 ~ 600.00Hz	60.00
03-45	AUI Point1 - voltage	0.00~10.00V	0.00
03-46	AUI Point 2- percent	0.00 ~ 600.00Hz	0.00
03-47	AUI Point 2- voltage	0.00~10.00V	10.00
03-48	AUI Point2 - Hz	0.00 ~ 600.00Hz	60.00
03-49	AUI Point 3- voltage	0.00~10.00V	10.00
03-50	AUI Point 3 - Hz	0.00~600.00Hz	60.00

Multi-step Speed Parameters

Table 5. Multi-step Speed Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	04-00	1st Step Speed Frequency	0.00~600.00Hz	30.00
✓	04-01	2nd Step Speed Frequency	0.00~600.00Hz	40.00
✓	04-02	3rd Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-03	4th Step Speed Frequency	0.00~600.00Hz	50.00
✓	04-04	5th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-05	6th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-06	7th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-07	8th Step Speed Frequency	0.00~600.00Hz	60.00
✓	04-08	9th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-09	10th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-10	11th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-11	12th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-12	13th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-13	14th Step Speed Frequency	0.00~600.00Hz	5.50
✓	04-14	15th Step Speed Frequency	0.00~600.00Hz	5.50

Motor Parameters

Table 6. Motor Parameters

	Parameter	Explanation	Settings	Factory Setting
	05-00	Motor Auto Tuning	0: No function 1: Measure induction motor in dynamic status (motor spinning) (Rs, Rr, Lm, Lx, no-load current) 2: Measure induction motor in static status (motor not spinning) 0~10	0
	05-01	Full-Load current of Induction Motor 1 (Amps)	10~120% of the drive's rated current	###.##
↗	05-02	Rated Power of Induction Motor 1 (kW)	0~655.35kW	###.##
↗	05-03	Rated Rotational Speed of Induction Motor 1 (rpm)	0~65535 1710 (60Hz 4 poles): 1410 (50Hz 4 poles)	1710
	05-04	Pole Number of Induction Motor 1	2~20	4
	05-05	No Load Current of Induction Motor 1 (Amps)	0~ Pr.05-01 of factory setting	###.##
	05-06	Accumulated Motor Operation Time (minutes)	00~1439	0
	05-07	Accumulative Motor Operation Time (day)	00~65535	0

Protection Parameters

Table 7. Protection Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	06-00	Low Voltage Level	230V: 160.0~220.0Vdc 460V: 320.0~440.0Vdc	180 360
✓	06-01	Over-voltage Stall Prevention	230V: 350.0~450.0Vdc 460V: 700.0~900.0Vdc	380.0 760.0
✓	06-02	Over-current Stall Prevention during Acceleration	Heavy duty: 0~160%(100%: drive's rated current); Normal duty: 0~130%(100%: drive's rated current)	Heavy duty: 120; Normal duty: 120
✓	06-03	Over-current Stall Prevention during Operation	Normal Load: 0~160%(100%: drive's rated current); Normal duty: 0~130%(100%: drive's rated current)	Heavy duty: 120; Normal duty: 120
✓	06-04	Accel. /Decel. Time Selection of Stall Prevention at Constant Speed	0: by current accel/decel time 1: by the 1st accel/decel time 2: by the 2nd accel/decel time 3: by the 3rd accel/decel time 4: by the 4th accel/decel time 5: by auto accel/decel	0
✓	06-05	Over-torque Detection Selection (OT1)	0: No function 1: Over-torque detection during constant speed operation, continue to operate after detection 2: Over-torque detection during constant speed operation, stop operation after detection 3: Over-torque detection during operation, continue to operate after detection 4: Over-torque detection during operation, stop operation after detection	0
✓	06-06	Over-torque Detection Level (OT1)	10~200%, 100%: drive's rated current	120
✓	06-07	Over-torque Detection Time (OT1)	0.0~60.0 seconds	0.1
✓	06-08	Over-torque Detection Selection (OT2)	0: No function 1: Over-torque detection during constant speed operation, continue to operate after detection 2: Over-torque detection during constant speed operation, stop operation after detection 3: Over-torque detection during operation, continue to operation after detection 4: Over-torque detection during operation, stop operation after detection	0
✓	06-09	Over-torque Detection Level (OT2)	10~200%, 100%: drive's rated current	120
✓	06-10	Over-torque Detection Time (OT2)	0.0~60.0 seconds	0.1
✓	06-11	Maximum Torque Limit	0~250% (100%: drive's rated current)	170%
✓	06-12	Electronic Thermal Relay Selection (Motor 1)	0: Motor with constant torque output 1: Motor with variable torque output 2: Electronic Thermal Relay disabled	2
✓	06-13	Electronic Thermal Characteristic for Motor 1	30.0~600.0 seconds	60.0

Table 7. Protection Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	06-14	Heat Sink Over-heat (OH1) Warning	0.0~110.0	85.0
✓	06-15	Stall Prevention Limit Level	0~100% (Parameter06-02?Parameter06-03)	50
	06-16	Current Error Record	0: No fault record 1: Over-current during acceleration (ocA) 2: Over-current during deceleration (ocd) 3: Over-current during constant speed(ocn) 4: Ground fault (GFF) 5: IGBT short-circuit (occ) 6: Over-current at stop (ocS) 7: Over-voltage during acceleration (ovA) 8: Over-voltage during deceleration (ovd) 9: Over-voltage during constant speed (ovn) 10: Over-voltage at stop (ovS) 11: Low-voltage during acceleration (LvA) 12: Low-voltage during deceleration (Lvd) 13: Low-voltage during constant speed (Lvn) 14: Stop mid-low voltage (LvS) 15: Phase loss protection (PHL) 16: IGBT over-heat (oH1) 17: Capacitance over-heat (oH2) (over 40hp) 18: tH1o (TH1 open: IGBT over-heat protection error) 19: tH2o (TH2 open: capacitance over-heat protection error) 20: Reserved 21: Drive over-load (oL) (When current is 150% of the rated current, the drive will be overloaded.) 22: Electronics thermal relay 1 (EoL1) 23: Electronics thermal relay 2 (EoL2) 24: Motor overheat (oH3) (PTC) 25: Reserved 26: Over-torque 1 (ot1) 27: Over-torque 2 (ot2) 28: Under current 1 (uc1) 29: Reserved 30: Memory write-in error (cF1) 31: Memory read-out error (cF2) 32: Reserved 33: U-phase current detection error (cd1) 34: V-phase current detection error (cd2) 35: W-phase current detection error (cd3) 36: Clamp current detection error (Hd0) 37: Over-current detection error (Hd1) 38: Over-voltage detection error (Hd2) 39: Ground current detection error (Hd3) 40: Auto tuning error (AuE) 41: PID feedback loss (AFE) 42~47 Reserved 48: ACI reference input loss (ACE) 49: External fault input (EF) 50: Emergency stop (EF1)	Read Only
	06-17	Second Most Recent Error Record		Read Only
	06-18	Third Most Recent Error Record		Read Only
	06-19	Fourth Most Recent Error Record		Read Only
	06-20	Fifth Most Recent Error Record		Read Only
	06-21	Sixth Most Recent Error Record		Read Only
✓	06-22	Fault Output Option 1	0~65535(refer to bit table for fault code)	0
✓	06-23	Fault Output Option 2	0~65535(refer to bit table for fault code)	0
✓	06-24	Fault Output Option 3	0~65535(refer to bit table for fault code)	0

Table 7. Protection Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	06-25	Fault Output Option 4	0~65535(refer to bit table for fault code)	0
✓	06-26	PTC Detection Selection	0: Warn and keep operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning	0
✓	06-27	PTC Level	0.0~100.0%	50.0
✓	06-28	Frequency Command when Malfunction	0.00~655.35 Hz	Read Only
	06-29	Output Frequency when Malfunction	0.00~655.35 Hz	Read Only
	06-30	Output Voltage when Malfunction	0.0~6553.5 V	Read Only
	06-31	DC Voltage at Malfunction	0.0~6553.5 V	Read Only
	06-32	Output Current at Malfunction	0.00~655.35 Amp	Read Only
	06-33	IGBT Temperature at Malfunction	0.0~6553.5	Read Only
	06-34	Capacitance Temperature at Malfunction	0.0~6553.5	Read Only
	06-35	Motor Speed in rpm at Malfunction	0~65535	Read Only
	06-36	Status of Multi-function Input Terminal when Malfunction	0~65535	Read Only
	06-37	Status of Multi-function Output Terminal when Malfunction	0~65535	Read Only
	06-38	Drive Status when Malfunction	0~65535	Read Only
	06-39	Action for detected Output Phase Loss (OPhL)	0: Warn and keep operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning	3
	06-40	Time of detected Output Phase Loss	0~65.535 seconds	3.000
	06-41	Detected Current Bandwidth	0~655.35%	0.00
	06-42	DC Brake Time of Output Phase Loss	0~65.535 seconds	0.000
	06-43	Time of detected Input Phase Loss	0.00~600.00 seconds	0.20
	06-44	Ripple of the detected Input Phase Loss' Ripple	230V: 0.0 ~ 160 Vdc 460V: 0.0 ~ 320 Vdc	30/60
	06-45	Action for detected Input Phase Loss (OrP)	0: warn and ramp to stop 1: warn and coast to stop	1

Table 7. Protection Parameters

Parameter	Explanation	Settings	Factory Setting
06-46	Derating Protection	0: Constant rated current and limit carrier wave by loaded current and temperature 1: Constant carrier frequency and limit loaded current by setting carrier wave 2: Constant rated current(same as setting 0), but current limit is closed	1
06-47	PT100 Detection Level 1	0.000~10.000 v	5.000
06-48	PT100 Detection Level 2	0.000~10.000 v	7.000
06-49	PT100 Level 1 Frequency Protect	0.00~600.00 Hz	0.00
06-50	Software Detection GFF Current Level (% rated current of the drive)	0~6553.5%	60.0
06-51	Software detection of GFF Low pass Filter gain	0~655.35 sec	0.10
06-52	Disable Level of dEb	230V: 0~220.0 Vdc 460V: 0~440.0 Vdc	180.0/ 360.0
06-53	Fault Record 1 (Min)	0~65535 minutes	Read Only
06-54	Fault Record 2 (Min)	0~65535 minutes	Read Only
06-55	Fault Record 3 (Min)	0~65535 minute	Read Only
06-56	Fault Record 4 (Min)	0~65535 minutes	Read Only
06-57	Fault Record 5 (Min)	0~65535 minutes	Read Only
06-58	Fault Record 6 (Min)	0~65535 minutes	Read Only
06-59	Number of Days of Malfunction (days)	Read Only	Read Only
06-60	Duration of Malfunction (minutes)	Read Only	Read Only
06-61	Low Current Setting Level	0~100.0%	0
06-62	Low Current Detection Time	0~360.00 seconds	0
06-63	Options when low current occurs	0 : No function 1 : Warn and coast to stop 2 : Warn and ramp to stop by 2nd deceleration time 3 : Warn and operation continues	0
06-64	Fire mode	0: No function 1: Forward operation 2: Reverse Operation	1
06-65	Operating Frequency when running Fire Mode(Hz)	0.00 to 600.00Hz	60.00

Table 7. Protection Parameters

Parameter	Explanation	Settings	Factory Setting
06-66	Bypass Fire Mode enabled	0: Disable Bypass 1: Enable Bypass	0
06-67	Delayed Time when Bypass Fire Mode	0.0 to 6550.0 sec	0
06-68	Auto reset counter of Fire Mode	0~10	0
06-69	Length of time to reset auto-counter (seconds)	0.0 to 6000.0 sec	60.0

Special Parameters

Table 8. Special Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	07-00	Setup Software Brake Level	230V: 350.0~450.0Vdc 460V: 700.0~900.0Vdc	380.0 760.0
✓	07-01	DC Brake Current Level	0~100%	0
✓	07-02	DC Brake Time at Start-up	0.0~60.0 seconds	0.0
✓	07-03	DC Brake Time at Stop	0.0~60.0 seconds	0.0
✓	07-04	Startup Frequency for DC Brake	0.00~600.00Hz	0.00
✓	07-05	Restart after Momentary Power Down	0: Stop operation 1: Speed search starting from last speed before the moment of power down. 2: Speed search starting from minimum output frequency	1
✓	07-06	Maximum Power Loss Duration	0.1~20.0 seconds	2.0
✓	07-07	Base Block Time	0.1~5.0 seconds	0.5
✓	07-08	Current Limit for Speed Search	20~200%	100
✓	07-09	Base Block Speed Search (oc, ov, bb)	0: Stop operation 1: Speed search starting from last speed before the moment of base block. 2: Speed search starting from minimum output frequency	0
✓	07-10	# of Auto Reset after Errors Occurred	0~10	4
✓	07-11	Speed Search while Start-up	0: Disable 1: Speed search starting from maximum output frequency 2: Speed search starting from start-up motor frequency 3: Speed search starting from minimum output frequency	0

Table 8. Special Parameters

	Parameter	Explanation	Settings	Factory Setting
	07-12	Deceleration Time at Momentary Power Down (dEb function: Deceleration Energy Backup)	0: Disable 1: 1st decel. time 2: 2nd decel. time 3: 3rd decel. time 4: 4th decel. time 5: system decel. time 6: Auto decel. time	0
	07-13	DEB Return Time	0.0~25.0 sec	0
	07-14	Dwell Time at Accel.	0.00~600.00sec	0
	07-15	Dwell Frequency at Accel.	0.00~600.00Hz	0
	07-16	Dwell Time at Decel.	0.00~600.00sec	0
	07-17	Dwell Frequency at Decel.	0.00~600.00Hz	0
✓	07-18	Fan Cooling Control	0: Fan always ON 1: 1 minute after the VFD stops, fan will be OFF 2: When the VFD runs, the fan is ON. When the VFD stops, the fan is OFF 3: Fan turns ON when the preliminary heat sink's temperature reached around 60°C (140°F). 4: Fan always OFF	3
✓	07-19	Emergency Stop (EF) & Force to Stop Selection	0: Coast stop 1: By deceleration Time 1 2: By deceleration Time 2 3: By deceleration Time 3 4: By deceleration Time 4 5: System Deceleration 6: Automatic Deceleration	0
✓	07-20	Auto Energy-sAVI1ng Operation	0: Disable 1: Enable	1
✓	07-21	Energy-sAVI1ng Gain	10~1000%	100
✓	07-22	Auto Voltage Regulation(AVR) Function	0: Enable AVR 1: Disable AVR 2: Disable AVR during deceleration	2
	07-23	PWM Fan Speed 0~100%	0~100	60

High-function PID Parameters

Table 9. High-function PID Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	08-00	Input Terminal for PID feedback	0: No function 1: Negative PID feedback: input from external terminal AVI1 (Pr.03-00) 4: Positive PID feedback from external terminal AVI1 (Pr.03-00)	0
✓	08-01	Proportional Gain (P)	0.0~500.0%	1.0
✓	08-02	Integral Time (I)	0.00~100.00 seconds	1.00
✓	08-03	Derivative Time (D)	0.00~1.00seconds	0.00
✓	08-04	Upper Limit of Integral Control	0.0~100.0%	100.0
✓	08-05	PID Output Frequency Limit	0.0~110.0%	100.0
✓	08-06	PID Delay Time	0.0~35.0 seconds	0.0
✓	08-07	Feedback Signal Detection Time	0.0~3600.0 seconds	0.0
✓	08-08	Options on Feedback Error	0: Warn and keep operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: Warn and operate at last frequency	0
✓	08-09	Sleep Frequency	0.00~600.00Hz or 0~200.00%	0.00
✓	08-10	Wake-up Frequency	0.00~600.00Hz or 0~200.00%	0.00
✓	08-11	Sleep Time	0.0~6000.0 seconds	0.0
✓	08-12	PID Deviation Level	1.0~50.0%	10.0
✓	08-13	PID Deviation Time	0.1~300.0 seconds	5.0
✓	08-14	Filter Time for PID Feedback	0.1~300.0 seconds	5.0
✓	08-15	PID Compensation Selection	0: Parameter setting 1: Analog input	0
✓	08-16	PID Compensation	-100.0~+100.0%	0
	08-17	Setting of Sleep mode function	0: Follow PID output command 1: Follow PID feedback signal	0
	08-18	Integral Limit during Wakeup	0~200.0%	50.0%
	08-19	PID Mode Selection	0: Serial connection 1: Parallel connection	0
	08-20	Enable PID to Change Operating Direction (PID Reserve)	0: Operating direction cannot be changed 1: Operating direction can be changed	0

Communication Parameters

Table 10. Communication Parameters

	Parameter	Explanation	Settings	Factory Setting
✓	09-00	COM1 Communication Address	1~254	1
✓	09-01	Modbus Baudrate	4.8~115.2Kbps	9.6
✓	09-02	Modbus Transmission Fault Treatment	0: Warn and continue operation 1: Warn and ramp to stop 2: Warn and coast to stop 3: No warning and continue operation	3
✓	09-03	Modbus Time-out Detection	0.0~100.0 seconds	0.0
✓	09-04	Modbus Communication Protocol	0: 7N1 (ASCII) 1: 7N2 (ASCII) 2: 7E1 (ASCII) 3: 7O1 (ASCII) 4: 7E2 (ASCII) 5: 7O2 (ASCII) 6: 8N1 (ASCII) 7: 8N2 (ASCII) 8: 8E1 (ASCII) 9: 8O1 (ASCII) 10: 8E2 (ASCII) 11: 8O2 (ASCII) 12: 8N1 (RTU) 13: 8N2 (RTU) 14: 8E1 (RTU) 15: 8O1 (RTU) 16: 8E2 (RTU) 17: 8O2 (RTU)	1
✓	09-05	Response Delay Time	0.0~200.0ms	2.0
✓	09-06	Main Communication Frequency (Hz)	0.00~600.00Hz	60.00
✓	09-07	Block Transfer 1	0~65535	0
✓	09-08	Block Transfer 2	0~65535	0
✓	09-09	Block Transfer 3	0~65535	0
✓	09-10	Block Transfer 4	0~65535	0
✓	09-11	Block Transfer 5	0~65535	0
✓	09-12	Block Transfer 6	0~65535	0
✓	09-13	Block Transfer 7	0~65535	0
✓	09-14	Block Transfer 8	0~65535	0
✓	09-15	Block Transfer 9	0~65535	0
✓	09-16	Block Transfer 10	0~65535	0
✓	09-17	Block Transfer 11	0~65535	0
✓	09-18	Block Transfer 12	0~65535	0
✓	09-19	Block Transfer 13	0~65535	0
✓	09-20	Block Transfer 14	0~65535	0
✓	09-21	Block Transfer 15	0~65535	0
✓	09-22	Block Transfer 16	0~65535	0

Table 10. Communication Parameters

Parameter	Explanation	Settings	Factory Setting
09-23	Communication Decoding Method	0: Definition (20XX) 1: Definition (60XX)	1
09-24	COM1 Protocol	0: RS485 1: BACnet	0
09-25	PLC Address	1~254	2
09-26	CANopen Slave Address	0: Disable 1~127	0
09-27	CANopen Speed	0: 1M 1: 500k 2: 250k 3: 125k 4: 100k 5: 50k	0
09-28	CANopen Frequency Gain	1.00 ~ 2.00	1.00
09-29	CANopen Warning Record	bit 0: CANopen Guarding Time out bit 1: CANopen Heartbeat Time out bit 2: CANopen SYNC Time out bit 3: CANopen SDO Time out bit 4: CANopen SDO buffer overflow bit 5: Can Bus Off bit 6: Error protocol of CANopen	0
09-30	CANopen Decoding Standard	0: Communication definition of VFD CORE series 1: CANopen DS402 Standard	1
09-31	CANopen Communication Status	0: Node Reset State 1: Com Reset State 2: Boot up State 3: Pre Operation State 4: Operation State 5: Stop State	0
09-32	CANopen Control Status	0: Not Ready For Use State 1: Inhibit Start State 2: Ready To Switch On State 3: Switched On State 4: Enable Operation State 7: Quick Stop Active State 13: Err Reaction Active State 14: Error State	0
09-33	Reset CAN Initial Idx	bit0: reset address 20XX to 0. bit1: reset address 264X to 0 bit2: reset address 26AX to 0 bit3: reset address 60XX to 0	65535
09-34	CANopen Master function	0: Use 420XX 1: Use 60XX	0
09-35	CAN Master / Slave	0: Diable; 1:Enable Master	0
09-36	CANopen Master Address	1~127	100
09-37	BACnet Dnet MAC ID	0~127	10
09-38	BACnet Baud Rate	96~384 Kbps	384
09-39	BACnet Device ID L	0~65535	1
09-40	BACnet Device ID H	0~63	0

Table 10. Communication Parameters

Parameter	Explanation	Settings	Factory Setting
09-41	BACnet Polling Address	0~127	127
09-42	BACnet Password	0~65535	0
09-43	Identification of Communication Card	0: No communication card 1: DeviceNet Slave 2: Profibus-DP Slave 3: CANopen Slave 4: Modbus-TCP Slave 5: EtherNet/IP Slave 6~8: Reserved	0
09-44	Firmware Version of Communication Card	Read Only	Read Only
09-45	Product Code	Read Only	Read Only
09-46	Error Code	Read Only	Read Only
09-47	Address of Communication Card	DeviceNet: 0-63 Profibus-DP: 1-125	1
09-48	Communication Card Speed	Standard DeviceNet: 0: 100Kbps 1: 125Kbps 2: 250Kbps 3: 1Mbps Non standard DeviceNet: 0: 10Kbps 1: 20Kbps 2: 50Kbps 3: 100Kbps 4: 125Kbps 5: 250Kbps 6: 500Kbps 7: 800Kbps 8: 1Mbps	2
09-49	Other settings of communication card speed	0: Disable In this mode, baud rate can only be 0,1,2,3 in standard DeviceNet speed 1: Enable In this mode, the baud rate of DeviceNet can be same as CANopen (0-8)	0
09-50	IP Configuration of the Communication Card	0: Static IP 1: Dynamic IP (DHCP)	0
09-51	IP Address 1 of the Communication Card	0~255	0
09-52	IP Address 2 of the Communication Card	0~255	0
09-53	IP Address 3 of the Communication Card	0~255	0
09-54	IP Address 4 of the Communication Card	0~255	0
09-55	Address Mask 1 of the Communication Card	0~255	0

Table 10. Communication Parameters

Parameter	Explanation	Settings	Factory Setting
09-56	Address Mask 2 of the Communication Card	0~255	0
09-57	Address Mask 3 of the Communication Card	0~255	0
09-58	Address Mask 4 of the Communication Card	0~255	0
09-59	Gateway Address 1 of the Communication Card	0~255	0
09-60	Gateway Address 2 of the Communication Card	0~255	0
09-61	Gateway Address 3 of the Communication Card	0~255	0
09-62	Gateway Address 4 of the Communication Card	0~255	0
09-63	Password for Communication Card (Low word)	0~99	0
09-64	Password for Communication Card (High word)	0~99	0
09-65	Reset Communication Card	0: No function 1: Reset to return to the factory setting	0
09-66	Additional Setting for Communication Card	Bit 0: Enable IP Filter : Bit 1: Enable internet parameters (1bit) Once the setup of internet parameter is done, the Bit 1 will be enabled. But after the parmeters of the communication card are updated, this Bit 1 will be disabled. Bit 2: Enable login password (1bit) When login password is correctly entered, the Bit 2 will be enabled. But after the parameters of the communication card are updated, this Bit 2 will be disabled.	0
09-67	Status of Communication Card	Bit 0: Enable password. When the communication card is locked by a password, this Bit 0 will be enabled. When the password is clear, this Bit 0 will be disabled.	0

PUMP Parameters

Table 11. Pump parameters

Parameter	Explanation	Settings	Factory Setting
10-00	Circulative Control	0: No operation 1: Fixed Time Circulation (by time) 2: Fixed quantity circulation (by PID) 3: Fixed quantity control 4: Fixed Time Circulation+ Fixed quantity circulation 5: Fixed Time Circulation+ Fixed quantity control	0
10-01	Number of motors to be connected	From only 1 and up to 8 motors	1
10-02	Operating time of each motor (minutes)	0 to 65500 min	0
10-03	Delay Time due to the Acceleration (or the Increment) at Motor Switching	0.0 to 3600.0 sec	1.0
10-04	Delay Time due to the Deceleration (or the Decrement) at Motor Switching (seconds)	0.0 to 3600.0 sec	1.0
10-05	Delay time while fixed quantity circulation at Motor Switching (seconds)	0.0 to 3600.0 sec	10.0
10-06	Frequency when switching motors at fixed quantity circulation (Hz)	0.00 to 600.00 Hz	60.00
10-07	Action to do when Fixed Quantity Circulation breaks down.	0: Turn off all output 1: Motors powered by mains electricity continues to operate.	0
10-08	Frequency when stopping auxiliary motor (Hz)	0.00 to 600.00 Hz	0

CHAPTER 12: DESCRIPTION OF PARAMETER SETTINGS

Drive Parameters

~ The parameter can be set during operation.

00 - 00 ID Code of the VFD

Factory Setting: #.#

Settings Read Only

00 - 01 Display VFD Rated Current

Factory Setting: #.#

Settings Read Only

- Pr. 00-00 displays the identity code of the VFD. Using the following table to check if Pr.00-01 setting is the rated current of the VFD. Pr.00-01 corresponds to the identity code Pr.00-01.
- The factory setting is the rated current for Heavy duty. Please set Pr.00-10 to 0 to display the rated current for the Normal duty.

230V series															
Frame	A					B			C			D		E	
kW	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
HP	1.0	2.0	3.0	5.0	7.5	10	15	20	25	30	40	50	60	75	100
ID Code of the VFD	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
Rated Current of Normal duty (A)	5	7.5	10	15	21	31	46	61	75	90	105	146	180	215	276
Rated Current of Heavy duty (A)	3	5	8	11	17	25	33	49	65	75	90	120	146	180	215

460V series																	
Frame	A							B			C			D			
kW	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
HP	1	2	3	5	5.5	7.5	10	15	20	25	30	40	50	60	75	100	125
ID Code of the VFD	5	7	9	11	93	13	15	17	19	21	23	25	27	29	31	33	35
Rated Current of Normal duty (A)	3	3.7	5	7.5	10.5	12	14	22.5	30	36	45	56	72	91	110	144	180
Rated Current of Heavy duty (A)	1.7	3.0	4.0	6.0	9.0-	10.5	12	18	24	32	38	45	60	73	91	110	150

00 - 02 Parameter Reset

Factory Setting: 0

Settings
0: No Function
1: Write protection for parameters
6: Reset PLC (including CANopen Master Index)
7: Reset CANopen Index (Slave)
8: keypad lock
9: All parameters are reset to factory settings (base frequency is 50Hz)

- When it is set to 1, all parameters are read only except Pr.00-02~00-08 and it can be used with password setting for password protection. It needs to set Pr.00-02 to 0 before changing other parameter settings.
- When it is set to 6: clear internal PLC program (includes the related settings of PLC internal CANopen master)
- When it is set to 7: reset the related settings of CANopen slave.
- When it is set to 9 or 10: all parameters are reset to factory settings. If the password is set in Pr.00-08, it needs to input the password set in Pr.00-07 to reset to factory settings.

00 - 03 Start-up Display Selection

Factory setting: 0

Settings
0: Display the frequency command (F)
1: Display the actual output frequency (H)
2: Display User define (U)
3: Output current (A)

- This parameter determines the start-up display page after power is applied to the drive. User defined choice display according to the setting in Pr.00-04.

00 - 04 Content of Multi-function Display (user defined)

Factory setting: 0

Settings
0: Display output current (A)
1: Display counter value (c)
2: Display actual output frequency (H.)
3: Display DC-BUS voltage (v)
4: Display output voltage (E)
5: Display output power angle (n)
6: Display output power in kW (P)
8: Display estimate output torque % (t = 00: positive torque; -00 negative torque) (t)
9: Display PG feedback (G) (refer to Note 1)
10: Display PID feedback in % (b)
11: Display AVI1 in % (1.), 0~10V/4-20mA/0-20mA corresponds to 0~100% (Refer to Note 2)
12: Display ACI in % (2.), 4~20mA/0~10V/0-20mA corresponds to 0~100% (Refer to Note 2)
13: Display AVI2 in % (3.), -10V~10V corresponds to -100~100% (Refer to Note 2)
14: Display the temperature of IGBT in °C (i.)
15: Display the temperature of capacitance in °C (c.)

16: The status of digital input (ON/OFF) refer to Pr.02-18 (i) (Refer to Note 3)

17: Display digital output status ON/OFF (Pr.02-15) (o) (refer to NOTE 4)

18: Display the multi-step speed that is executing (S)

19: The corresponding CPU pin status of digital input (d) (refer to NOTE 3)

20: The corresponding CPU pin status of digital output (0.) (refer to NOTE 4)

25: Overload counting (0.00~100.00%) (h.)

26: GFF Ground Fault (Unit: %)(G.)

27: DC Bus voltage ripple (Unit: Vdc)(r.)

28: Display PLC register D1043 data (C) display in hexadecimal

30: Display output of user defined (U)

31: H page x 00-05 Display user Gain (K)

NOTES:

1. It can display negative values when setting analog input bias (Pr.03-03~03-10).
   Example: assume that AVI1 input voltage is 0V, Pr.03-03 is 10.0% and Pr.03-06 is 4 (Serve bias as the center).
2. Example: If REV, MI1 and MI6 are ON, the following table shows the status of the terminals.
   0 means OFF, 1 means ON

Terminal	MI15	MI14	MI13	MI12	MI11	MI10	MI8	MI7	MI6	MI5	MI4	MI3	MI2	MI1	REV	FWD
Status	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0

MI10~MI15 are the terminals for extension cards (Pr.02-24~02-29).

If REV, MI1 and MI6 are ON, the value is 0000 0000 1000 0110 in binary and 0086h in HEX. When Pr.00-04 is set to “16” or “19,” it will display “0086h” with LED U is ON on the keypad. The setting 16 is the status of digital input by Pr.02-11 setting and the setting 19 is the corresponding CPU pin status of digital input. User can set to 16 to monitor digital input status and then set to 19 to check if the wire is normal.

NOTES:

3. Assume that RY1: Pr.02-13 is set to 9 (Drive ready). After applying the power to the VFD, if there is no other abnormal status, the contact will be OFF. The display status will be shown as follows.
   0 means OFF, 1 means ON

Terminal	Reserved				Reserved				Reserved				MO2	MO1	Reserved	RY2	RY1
Status	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Meanwhile, if Pr.00-04 is set to 17 or 20, it will display in hexadecimal “0001h” with LED U is ON on the keypad. The setting 17 is the status of digital output by Pr.02-16 setting and the setting 20 is the corresponding CPU pin status of digital output. User can set 17 to monitor the digital output status and then set to 20 to check if the wire is normal.

00 - v05 Coefficient Gain in Actual Output Frequency

Factory Setting: 0.00

Settings 0~160.00

- This parameter is to set coefficient gain in actual output frequency. Set Pr.00-04= 31 to display the calculation result on the screen (calculation = output frequency * Pr.00-05).

00 - 06 Software version

Factory Setting: #.#

Settings Read Only

00 - 07 Input Parameter Protection Password

Factory Setting: 0

Settings 0~65535

Display 0~4 (# of times of password attempts)

- This parameter allows user to enter their password (which is pre-set in Pr.00-08) to unlock the parameter protection and to make changes to the parameter.
- After you set up this parameter, make sure that you note its value for any future use.
- The purpose of hAVI1ng Pr.00-07 and Pr.00-08 is to prevent the personal misoperation.
- If you forget the password, clear the setting by input 9999 and press ENTER key, then input 9999 again and press Enter within 10 seconds. After decoding, all the settings will return to factory setting.
- When setting up a password all parameters read are 0, except parameter 00-08.

00 - 08 Set up a Parameter Protection Password

Factory Setting: 0

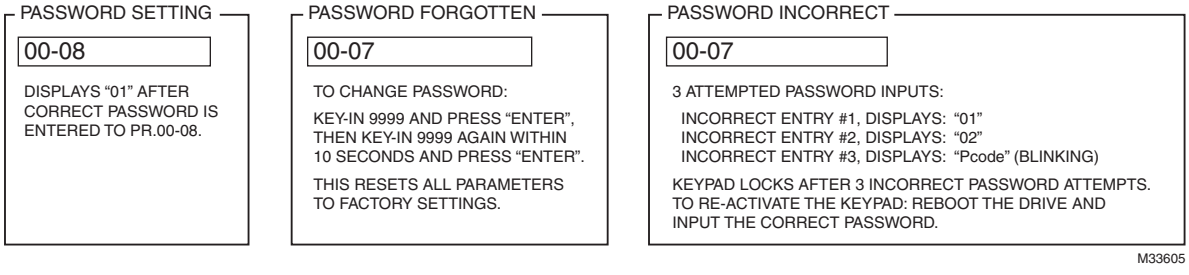
Settings 0~65535

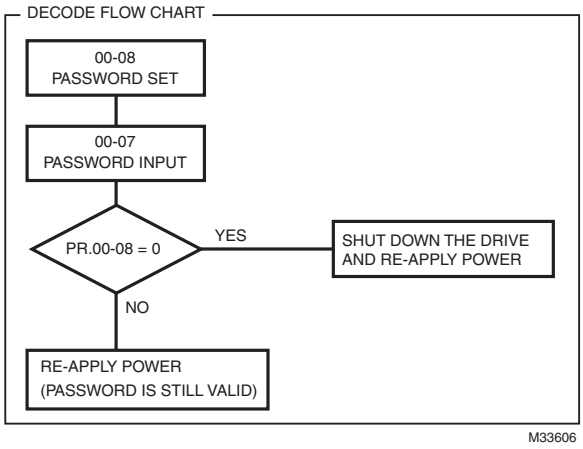
Display 0: No password protection / password is entered correctly (Pr00-07)

1: Password has been set

- This parameter is for you to set up a password to protect your parameter settings from unauthorized modifications. For the very first set up, enter directly a password of your choice. Once you finish entering that password, the setting of the parameter 8 will be 1. Then the password protection is activated. If you want to modify any parameter, go to parameter 00-07, enter the password that you set up here. If the right password is entered, then the parameter 00-08 will be 0 and you can modify any parameter.
- Once you decode the parameter protection number at Parameter 00-07 and set the parameter to 0, the password protection will be canceled. There will not be password protection when you re-start the VFD CORE.
- Password setting is permanently effective. If VFD need to modify any parameter, decode the parameter protection at Parameter 00-07.

- How to re-start the parameter protection after the password is decode?
  - Method01: Go to parameter 00-08, enter once a new password.
  - Method02: Reboot the VFD CORE to restore the setting
  - Method03: Input any value into Pr.00-07 (Do not enter the password).





00 - 09 Display Advanced Parameters

Factory Setting: 0

Settings
Bit 0: Group 0
Bit 1: Group 1
Bit 2: Group 2
Bit 3: Group 3
Bit 4: Group 4
Bit 5: Group 5
Bit 6: Group 6
Bit 7: Group 7
Bit 8: Group 8
Bit 9: Group 9
(Bin Setting and Display for LCD Keypad)

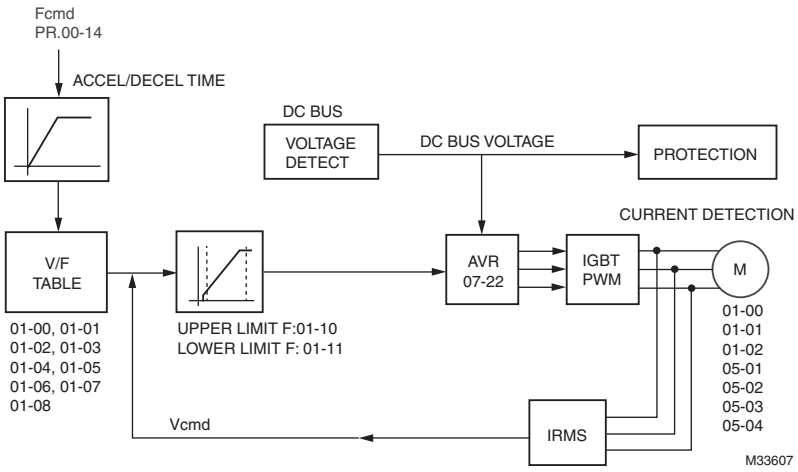
00 - 10 Velocity Control Mode

Factory Setting: 0

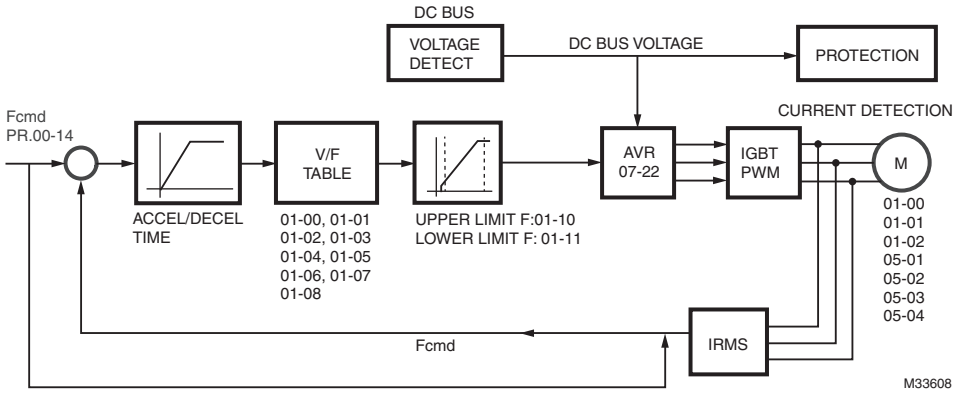
Settings
0: V/F (V/F control)
2: SVC (Sensorless Vector Control)

- This parameter determines the control method of the VFD:?
  — 0: V/F control: user can design proportion of V/f as required and can control multiple motors simultaneously.
  — 2: Sensorless vector control: get the optimal control by the auto-tuning of motor parameters.

- When setting Pr.00-10 to 0, the V/F control diagram is shown as follows.



- When setting Pr.00-10 to 2, the sensorless vector control diagram is shown as follows.



00 - 11 Loading mode selection

Factory Setting: 0

Settings 0: Normal duty

1: Heavy duty

- Normal duty 230V series & 460V series: When the output current is 110% of the rated output current, the endurance time is 60 seconds. When the output current is 130% of the rated output current, the endurance time is 3 seconds. Refer to Pr.00-12 for the setting of carrier frequency. Refer to Pr.00-01 for the rated current.
- Heavy duty 230 V series & 460V series: When the output current is 120% of the rated output current, the endurance time is 60 seconds. When the output current is 160% of the rated output current, the endurance time is 3 seconds. Refer to Pr.00-12 for the setting of carrier frequency. Refer to Pr.00-01 for the rated current.

00 - 12 Carrier Frequency

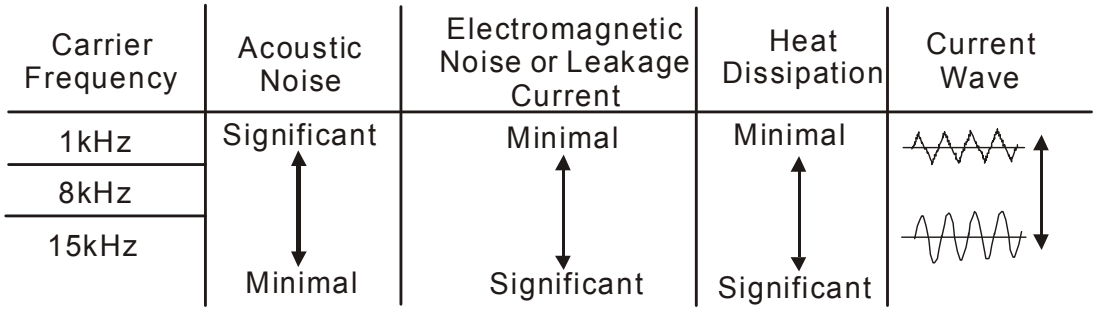
Factory Setting: As shown in table below

Settings 2~15kHz

- This parameter determinates the PWM carrier frequency of the VFD.

230V series			
Models	1-20HP [0.75-15kW]	25-60HP [18.5-45kW]	75-125HP [55-90kW]
Settings	02~15kHz	02~10kHz	02~09kHz
Normal Duty Factory Setting	8kHz	6kHz	4kHz
Heavy Duty Factory Setting	8 kHz	6 kHz	4 kHz

460V series			
Models	1-25HP [0.75-18.5kW]	30-100HP [22-75kW]	125-536HP [90-400kW]
Settings	02~15kHz	02~10kHz	02~09kHz
Normal Duty Factory Setting	2kHz	2kHz	2kHz
Heavy Duty Factory Setting	8 kHz	6 kHz	4 kHz



- From the table, we see that the PWM carrier frequency has a significant influence on the electromagnetic noise, VFD heat dissipation, and motor acoustic noise. Therefore, if the surrounding noise is greater than the motor noise, lower the carrier frequency is good to reduce the temperature rise. Although it is quiet operation in the higher carrier frequency, the entire wiring and interference resistance should be considered.
- When the carrier frequency is higher than the factory setting, it needs to protect by decreasing the carrier frequency. See Pr.06-46 for the related setting and details.

00 - 13 PLC Command Mask

Factory Setting: Read Only

Settings Bit 0: Control command controls by PLC
Bit 1: Frequency command controls by PLC
Bit 2: Reserved
Bit 3: Reserved

00 - 14 Source of the MASTER Frequency Command (AUTO)

Factory Setting: 0

Settings 0: Digital keypad
1: RS-485 serial communication

2: External analog input (Pr.03-00)

3: External UP/DOWN terminal

6: CANopen communication card

8: Communication card (no CANopen card)

- It is used to set the source of the master frequency in AUTO mode.
- Pr.00-14 and 00-15 are for the settings of frequency source and operation source in AUTO mode. Pr.00-23 and 00-24 are for the settings of frequency source and operation source in HAND mode. The AUTO/HAND mode can be switched by the keypad or multi-function input terminal (MI).
- The factory setting of frequency source or operation source is for AUTO mode. It will return to AUTO mode whenever power on again after power off. If there is multi-function input terminal used to switch AUTO/HAND mode. The highest priority is the multi-function input terminal. When the external terminal is OFF, the drive won't receive any operation signal and can't execute JOG.

00 - 15 Source of the Operation Command (AUTO)

Factory Setting: 0

Settings 0: Digital keypad

1: External terminals. Keypad STOP disabled.

2: RS-485 serial communication. Keypad STOP disabled.

3: CANopen card

5: Communication card (not includes CANopen card)

- It is used to set the source of the operation frequency in AUTO mode.
- When the operation command is controlled by the keypad, keys RUN, STOP and JOG (F1) are valid.

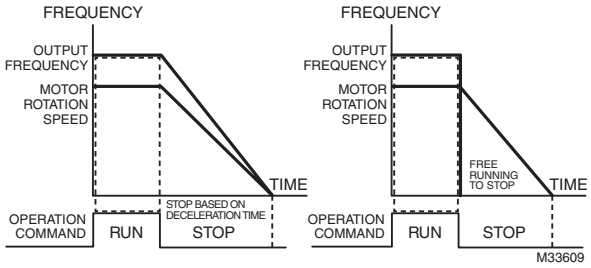
00 - 16 Stop Mode

Factory Setting: 0

Settings 0: Ramp to stop

1:Coast to stop

- The parameter determines how the motor is stopped when the VFD receives a valid stop command.



1. **Ramp to stop:** the VFD decelerates from the setting of deceleration time to 0 or minimum output frequency (Pr. 01-09) and then stop (by Pr.01-07).
2. **Coast to stop:** the VFD stops the output instantly upon a STOP command and the motor free runs until it comes to a complete standstill.
   - It is recommended to use "ramp to stop" for safety of personnel or to prevent material from being wasted in applications where the motor has to stop after the drive is stopped. The deceleration time has to be set accordingly.
   - If the motor free running is allowed or the load inertia is large, it is recommended to select "coast to stop". For example, blowers, punching machines and pumps

00 - 17 Motor Operating Direction Control

Factory Setting: 1

Settings 0: Enable forward/ reverse

1: Disable reverse

2: Disable forward

- This parameter enables the VFDs to run in the forward/reverse Direction. It may be used to prevent a motor from running in a direction that would consequently injure the user or damage the equipment.

00 - 18 Memory of Communication Frequency Command

Factory Setting: Read Only

Settings Read Only

- If keypad is the source of frequency command, when Lv or Fault occurs the present frequency command will be saved in this parameter.

00 - 19 User Defined Property

Factory Setting: 0

Settings B Bit 0~3: user define on decimal place
0000b: no decimal place
0001b: one decimal place
0010b: two decimal place
0011b: three decimal place
Bit 4~15: user define on unit
000xh: Hz
001xh: rpm
002xh: %
003xh: kg

- Bit 0~3: F & H page unit and Pr.00-20 decimal display is supported up to 3 decimal places.
- Bit 4~15: F & H page unit and Pr.00-20 unit display is supported up to 4 types of unit display.

00 - 20 Max. User Defined Value

Factory Setting: 0

Settings 0: Disable

0000B: 0~65535 (No decimal place in Pr.00-19 setting)

0001B: 0.0~6553.5 (One decimal place in Pr.00-19 setting)

0010B: 0.0~655.35 (Two decimal place in Pr.00-19 setting)

0011B: 0.0~65.536 (Three decimal place in Pr.00-19 setting)

- User define is enabled when Pr.00-20 is not 0. The setting of Pr.00-20 corresponds to Pr.01.00 (Max. output frequency of the drive).
  Example: User define: 100.0%, Pr.01.00 = 60.00Hz
  Pr.00.25 setting is 0021h; Pr.0026 setting is 100.0%

NOTE: In order to display as the setting in Pr.0025, please set up Pr.00.25 first and ensure Pr.00.26 is not set to 0.

00 - 21 User Defined Value

Factory Setting: Read Only

Settings Read Only

- Pr.00-21 will show user defined value when Pr.00-20 is not set to 0.

00 - 22 Local/Remote Selection

Factory Setting: 0

Settings
0: Standard HOA
1: LOC/REM not maintain
2: REM maintain
3: LOC maintain
4: LOC/REM maintain

00 - 23 Source of the Master Frequency Command (HAND)

Factory Setting: 0

Settings
0: Digital keypad
1: RS-485 serial communication
2: External analog input (Pr.03-00)
3: External UP/DOWN terminal
6: CANopen communication card
8: Communication card (no CANopen card)

- It is used to set the source of the master frequency in HAND mode.

00 - 24 Source of the Operation Command (HAND)

Factory Setting: 0

Settings
0: Digital keypad
1: External terminals. Keypad STOP disabled.
2: RS-485 serial communication. Keypad STOP disabled.
3: CANopen communication card
5: Communication card (not including CANopen card)

- It is used to set the source of the operation frequency in HAND mode.
- Pr.00-14 and 00-15 are for the settings of frequency source and operation source in AUTO mode. Pr.00-23 and 00-24 are for the settings of frequency source and operation source in HAND mode. The AUTO/HAND mode can be switched by the keypad or multi-function input terminal (MI).
- The factory setting of frequency source or operation source is for AUTO mode. It will return to AUTO mode whenever power on again after power off. If there is multi-function input terminal used to switch AUTO/HAND mode. The highest priority is the multi-function input terminal. When the external terminal is OFF, the drive won't receive any operation signal and can't execute JOG.

00 - 25 Enable Digital Keypad STOP Function

Factory Setting: 1

Settings 0: STOP key disable

1: STOP key enable

00 -26 Display Filter Time (Current)

Factory Setting: 0.100

Settings 0.001~65.535

- Set this parameter to minimize the **current fluctuation** displayed by digital keypad.

00 - 27 Display Filter Time on the Keypad

Factory Setting: 0.100

Settings 0.001~65.535

- Set this parameter to minimize the **display value fluctuation** displayed by digital keypad.

00 - 28 Software Version (date)

Factory Setting: Read Only

Settings 0~65535

- This parameter displays the drive's software version by date.

01 Basic Parameter

~ The parameter can be set during operation.

01 - 00 Maximum Output Frequency

Factory Setting: 60.00/50.00

Settings 50.00~600.00Hz

- This parameter determines the VFD's Maximum Output Frequency. All the VFD frequency command sources (analog inputs 0 to +10V, 4 to 20mA, 0 to 20mAand ±10V) are scaled to correspond to the output frequency range.

01 - 01 Motor1: Max Output Frequency (Hz) (Base Frequency/Motor Rated Frequency)

Factory Setting: 60.00

Settings 0.00~600.00Hz

01 - 02 Motor1: Max Output Voltage (V)

01 - 03 Mid-point Frequency 1 of Motor 1

Factory Setting: 230.00/460.00

Factory Setting: 3.0

Settings 230V series 0.0~255.0V
460V series 0.0~510.0V

Settings 0.00~600.00Hz

01 - 04 Mid-point Voltage 1 of Motor 1

Factory Setting: 11.0/22.0

Settings 230V series 0.0~255.0V

460V series 0.0~510.0V

01 - 05 Mid-point Frequency 2 of Motor 1

Factory Setting: 0.50

Settings 0.00~600.00Hz

01 - 06 Mid-point Voltage 2 of Motor 1

Factory Setting: 4.0/8.0

Settings 230V series 0.0~240.0V

460V series 0.0~480.0V

01 - 07 Min. Output Frequency of Motor 1

Factory Setting: 0.00

Settings 0.00~600.00Hz

01 - 08 Min. Output Voltage of Motor 1

Factory Setting: 0.0/0.0

Settings 230V series 0.0~240.0V

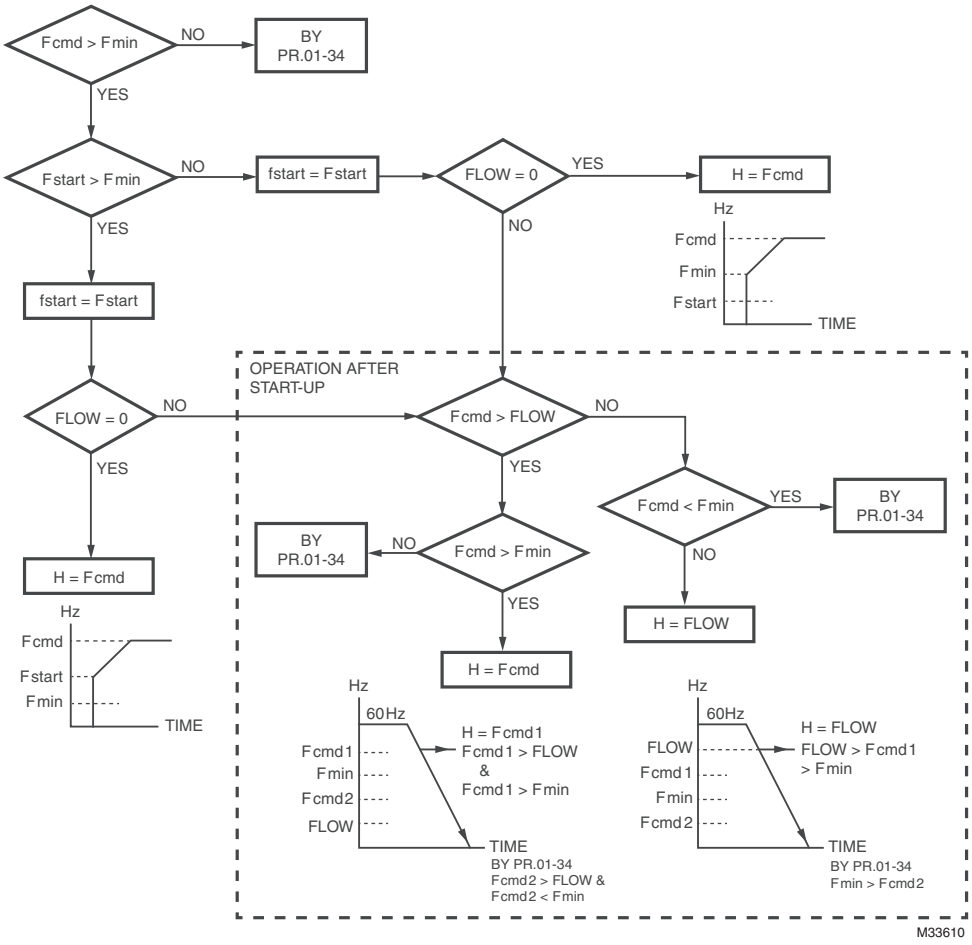
460V series 0.0~480.0V

01 - 09 Start-Up Frequency

Factory Setting: 0.50

Settings 0.0~600.00Hz

- When start frequency is higher than the min. out put frequency, drives' output will be from start frequency to the setting frequency. Please refer to the following diagram for details.
- **Fcmd**=frequency command,
  Fstart=start frequency (Pr.01-09),
  fstart=actual start frequency of drive,
  Fmin=4th output frequency setting (Pr.01-07/Pr.01-41),
  Flow=output frequency lower limit (Pr.01-11)



01 - 10 Output Frequency Upper Limit

Factory Setting: 62.00

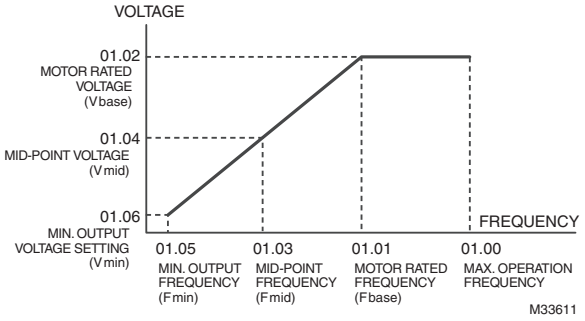
Settings 0.00~600.00Hz

01 - 11 Output Frequency Lower Limit

Factory Setting: 20.00

Settings 0.00~600.00Hz

- The upper/lower output frequency setting is used to limit the actual output frequency. If the frequency setting is **higher** than the upper limit, it will run with the upper limit frequency. If output frequency is **lower** than the output frequency lower limit and frequency setting is higher than min. frequency, it will run with lower limit frequency. The upper limit frequency should be set to be higher than the lower limit frequency.
- Pr.01-10 setting must be ³ Pr.01-11 setting. Pr.01-00 setting is regarded as 100.0%.
- This setting will limit the max. Output frequency of drive. If frequency setting is higher than Pr.01-10, the output frequency will be limited by Pr.01-10 setting.
- Related parameters: Pr.01-00 Max. Operation Frequency and Pr.01-11 Output Frequency Lower Limit



- This setting will limit the min. output frequency of drive. When drive frequency command or feedback control frequency is lower than this setting, drive output frequency will limit by the lower limit of frequency.
- When the drive starts, it will operate from min. output frequency (Pr.01-05) and accelerate to the setting frequency. It won't limit by this parameter setting.
- The setting of output frequency upper/lower limit is used to prevent the personal misoperation, the overheat due to too low operation frequency and the damage due to too high speed.
- If the output frequency upper limit setting is 50Hz and frequency setting is 60Hz, max. output frequency will be 50Hz.
- If the output frequency lower limit setting is 10Hz and min. operation frequency setting (Pr.01-05) is 1.5Hz, it will operate by 10Hz when the frequency command is greater than Pr.01-05 and less than 10Hz. If the frequency command is less than Pr.01-05, the drive will be in ready status and no output.
- If the frequency output upper limit is 60Hz and frequency setting is also 60Hz, it won't exceed 60Hz even after slip compensation. If the output frequency needs to exceed 60Hz, it can increase output frequency upper limit or max. operation frequency.

01 - 12 Accel. Time 1
01 - 13 Decel. Time 1
01 - 14 Aceel. Time 2
01 - 15 Decel. Time 2
01 - 16 Accel. Time 3
01 - 17 Decel. Time 3

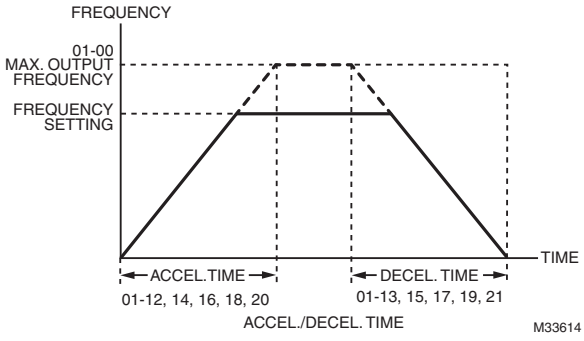
01 - 18 Accel. Time 4
01 - 19 Decel. Time 4
01 - 20 JOG Acceleration Time
01 - 21 JOG Deceleration Time

Factory Setting: Frame A, B,C: 30.00; Frame D,E: 60.00

Settings Parameters 01-37=0?0.00~600.00 seconds

Parameters 01-37=1?0.0~6000.0 seconds

- The Acceleration Time is to determine the length of time required for the VFD to ramp from 0.0 Hz to Maximum Output Frequency (Pr.01-00). The Deceleration Time is to determine the length of time required for an VFD to decrease from Maximum Output Frequency (Pr.01-00) to 0.00Hz.
- The Acceleration/Deceleration Time is invalid when using Pr.01-36 Optimal Acceleration/Deceleration Setting.
- The Acceleration/Deceleration Time 1, 2, 3, 4 are selected according to the Multi-function Input Terminals settings. The factory settings are Accel./Decel. Time 1.
- When enabling torque limits and stalls prevention function, actual accel./decel. time will be longer than the above action time.
- Please note that it may trigger the protection function (Pr.06-02 Over-current Stall Prevention during Acceleration or Pr.06-01 Over-voltage Stall Prevention) when the setting of accel./decel. time is too short.
- Please note that it may cause motor damage or drive protection enabled due to over current during acceleration when the setting of acceleration time is too short.
- Please note that it may cause motor damage or drive protection enabled due to over current during deceleration or over-voltage when the setting of deceleration time is too short.
- It can use suitable brake resistor (see Chapter 06 Accessories) to decelerate in a short time and prevent over-voltage.
- When enabling Pr.01-24~Pr.01-27, the actual accel./decel. time will be longer than the setting.



01 - 22 JOG Frequency (JOG)

Factory Setting: 6.00

Settings 0.00~600.00Hz

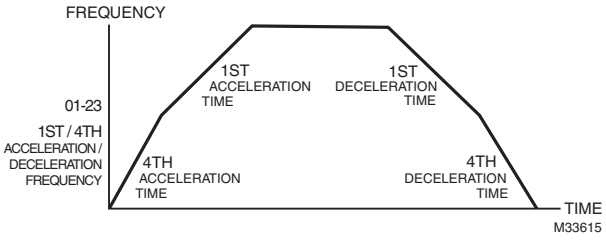
- Both external terminal JOG and key “F1” on the keypad can be used. When the jog command is ON, the VFD will accelerate from 0Hz to jog frequency (Pr.01-22). When the jog command is OFF, the VFD will decelerate from Jog Frequency to zero. The Jog Accel./Decel. time (Pr.01-20, Pr.01-21) is the time that accelerates from 0.0Hz to Pr.01-22 JOG Frequency.
- The JOG command can’t be executed when the VFD is running. In the same way, when the JOG command is executing, other operation commands are invalid except forward/reverse commands and STOP key on the digital keypad.
- The optional keypad doesn’t support JOG function.

01 - 23 Frequency of 1st Acceleration / Deceleration & Frequency of 4th Acceleration / Deceleration.

Factory Setting: 0.00

Settings 0.00~600.00Hz

- The transition from acceleration/deceleration time 1 to acceleration/deceleration time 4, may also be enabled by the external terminals. The external terminal has priority over Pr. 01-23.



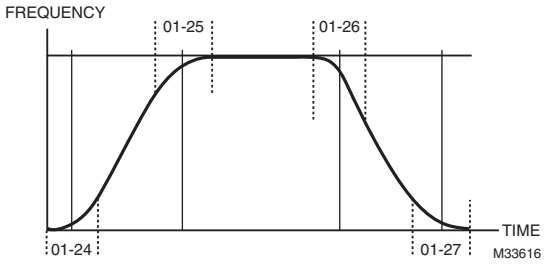
01 - 24 S-curve for Acceleration Departure Time 1
01 - 25 S-curve for Acceleration Arrival Time 2
01 - 26 S-curve for Deceleration Departure Time 1
01 - 27 S-curve for Deceleration Arrival Time 2

Factory Setting: 0.20/0.2

Settings Parameter 01-37=0: 0.00~25.00 seconds

Parameter 01-37=1: 0.00~250.0 seconds

- It is used to give the smoothest transition between speed changes. The accel./decel. curve can adjust the S-curve of the accel./decel. When it is enabled, the drive will have different accel./decel. curve by the accel./decel. time.
- The S-curve function is disabled when accel./decel. time is set to 0.
- When Pr.01-12, 01-14, 01-16, 01-18 ³ Pr.01-24 and Pr.01-25, the Actual Accel. Time = Pr.01-12, 01-14, 01-16, 01-18 + (Pr.01-24 + Pr.01-25)/2
- When Pr.01-13, 01-15, 01-17, 01-19 ³ Pr.01-26 and Pr.01-27, the Actual Decel. Time = Pr.01-13, 01-15, 01-17, 01-19 + (Pr.01-26 + Pr.01-27)/2

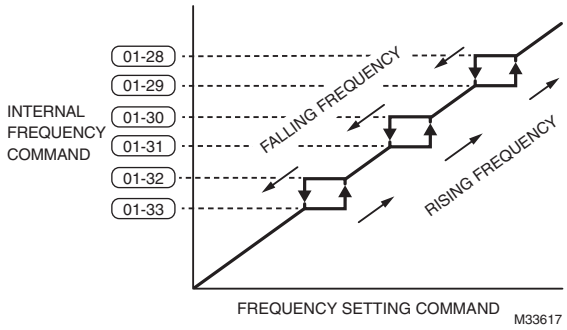


01 - 28 Upper limit of Frequency 1 setting not allowed
01 - 29 Lower limit of Frequency 1 setting not allowed
01 - 30 Upper limit of Frequency 2 setting not allowed
01 - 31 Lower limit of Frequency 2 setting not allowed
01 - 32 Upper limit of Frequency 3 setting not allowed
01 – 33 Lower limit of Frequency 3 setting not allowed

Factory Setting: 0.00

Settings 0.00~600.00Hz

- These parameters are used to set the skip frequency of the VFD. But the frequency output is continuous. There is no limit for the setting of these six parameters and can be used as required.
- These parameters are used to set the skip frequency of the VFD. But the frequency output is continuous. The limit of these six parameters is 01-28 ³ 01-29 ³ 01-30 ³ 01-31 ³ 01-32 ³ 01-33. This function will be invalid when setting to 0.0.
- The skip frequencies are useful when a motor has vibration at a specific frequency bandwidth. By skipping this frequency, the vibration will be avoided. It offers 3 zones for use.
- The setting of frequency command (F) can be set within the range of skip frequencies. At this moment, the output frequency (H) will be limited by these settings.
- When accelerating/decelerating, the output frequency will still pass the range of skip frequencies.



01 - 34 Zero-speed Mode

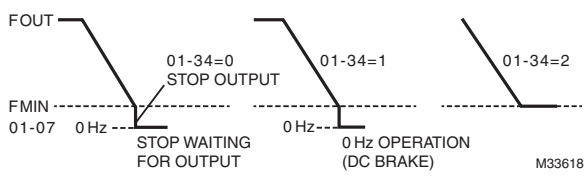
Factory Setting: 0

Settings 0: Output waiting

1: Zero-speed operation

2: Output at Minimum Frequency (the 4th output

- When the frequency is less than Fmin (Pr.01-07 or Pr.01-41), it will operate by this parameter.
- When it is set to 0, the VFD will be in waiting mode without voltage output from terminals U/V/W.
- When it is set to 1, it will execute DC brake by Vmin(Pr.01-08 and Pr.01-42) in V/F and SVC modes.
- When it is set to 2, the VFD will run by Fmin (Pr.01-07, Pr.01-41) and Vmin (Pr.01-08, Pr.01-42) in V/F and SVC modes.
- In V/F and SVC modes



01 – 35 V/F Curve Selection

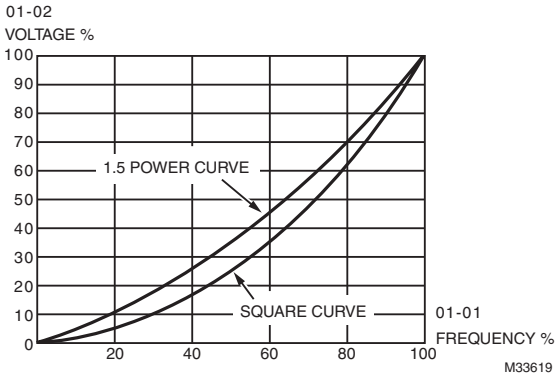
Factory Setting: 2

Settings 0: V/F curve determined by group 01

1: 1.5 power curve

2: Square curve

- When setting to 0, refer to Pr.01-01~01-08 for motor 1 V/f curve. For motor 2, refer to Pr.01-35~01-42.
- When setting to 1 or 2, the 2nd and the 3rd voltage frequency setting are invalid.
- If a motor load is a variable torque load (the torque is in direct proportion to the speed, such as the load of a fan or a pump), it will decrease input voltage to reduce flux loss and iron loss of the motor at low speed with low load torque to raise the entire efficiency.
- When setting the higher power V/F curve, low frequency torque will be even lower so it is not suitable for fast acceleration/deceleration. It is recommended NOT to apply this parameter for any fast acceleration/deceleration.



01 – 36 Optimal Acceleration/Deceleration Setting

Factory Setting: 0

Settings 0: Linear accel. /decel.

1: Auto accel., Linear decel.

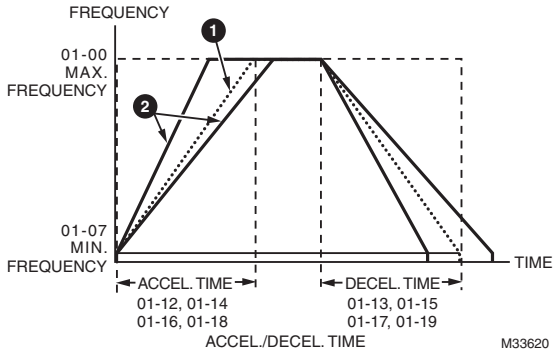
2: Linear accel., Auto decel.

3: Auto accel. / decel.

4: Linear, stall prevention by auto accel./decel. (limit by

- This parameter helps to decrease efficiently the mechanical vibration when a motor starts/stops a load. It auto-detects the torque size of a load, then it will accelerate to reach the frequency of your setting within the shortest time and the smoothest start-up current. It can also auto-detect the re-generated voltage of a load, and then it will decelerate to stop the motor within the shortest time and in a smoothest way.
- Setting 0 Linear accel./decel.: it will accelerate/decelerate according to the setting of Pr.01-12~01-19.
- Setting to Auto accel./decel.: it can reduce the mechanical vibration and prevent the complicated auto-tuning processes. It won't stall during acceleration so a brake resistor is not required. In addition, it can improve the operation efficiency and save energy.
- Setting 3 Auto accel./decel. (auto calculation of the accel./decel. time by actual load): this setting helps to decrease efficiently the mechanical vibration when the drive starts/stops a load. It auto-detects the torque size of a load, then it will accelerate to reach the frequency of your setting within the shortest time and the smoothest start-up current. It can also auto-detect the re-generated voltage of a load, and then it will decelerate to stop the drive within the shortest time and in a smoothest way.

- Setting 4 Stall prevention by auto accel./decel. (limited by 01-12 to 01-21): if the acceleration/deceleration is in a reasonable range, it will accelerate/decelerate in accordance with the setting of Pr.01-12~01-19. If the accel./decel. time is too short, the actual accel./decel. time will be greater than the setting of accel./decel. time.



01 – 37 Time Unit for Acceleration/Deceleration and S Curve

Factory Setting: 0

Settings 0: Unit 0.01 second

1: Unit 0.1 second

02 Digital Input/Output Parameter ~ The parameter can be set during operation.

02 - 00 2-wire/3-wire Operation Control

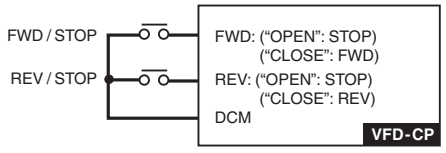
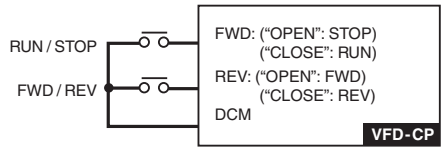
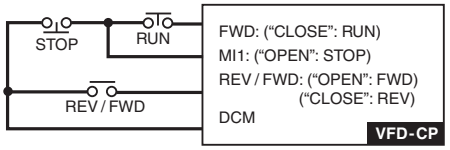
Factory Setting: 1

Settings 0: 2 wire mode 1

1: 2 wire mode 2

2: 3 wire mode

- This parameter is to set the operation control method. There are three different control modes.

02-00	CONTROL CIRCUITS OF THE EXTERNAL TERMINAL
WHEN THE SETTING IS 0 TWO - WIRE MODE 1 FWD / STOP REV / STOP	
WHEN SETTING IS 1 TWO - WIRE MODE 2 RUN / STOP REV / FWD	
3: THREE - WIRE OPERATION CONTROL	

M33621

02 - 01 Multi-function Input Command 1 (MI1) (MI1) When Pr02-00 is set at “3”: Three-wire operation control, the terminal M1 becomes the STOP contact

Factory Setting: 1

02 - 02 Multi-function Input Command 2 (MI2)

Factory Setting: 2

02 - 03 Multi-function Input Command 3 (MI3)

Factory Setting: 3

02 - 04 Multi-function Input Command 4 (MI4)

Factory Setting: 4

02 - 05 Multi-function Input Command 5 (MI5)

02 - 06 Multi-function Input Command 6 (MI6)

02 - 07 Multi-function Input Command 7 (MI7)

02 - 08 Multi-function Input Command 8 (MI8)

02 - 09 UP/DOWN Key Mode

Factory Setting: 0

Settings 0: UP/DOWN by the accel./decal. Time

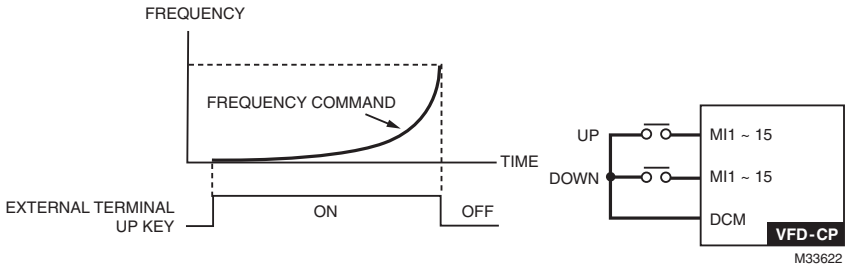
1: UP/DOWN constant speed (by parameter 02-10)

02 - 10 The Acceleration/Deceleration Speed of the UP/DOWN Key with Constant Speed

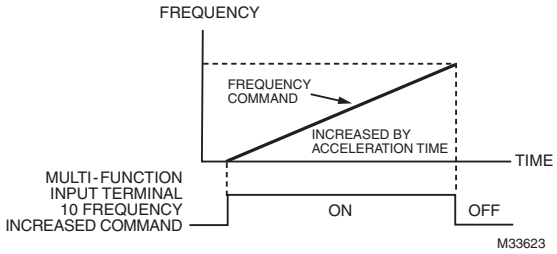
Factory Setting: 0.01

Settings 0.01~1.00Hz/ms

- These settings are used when multi-function input terminals are set to 19 or 20. Refer to Pr.02-09 and 02-10 for the frequency up/down command.
- When Pr.02-09 is set to 0: press the external terminal UP/DOWN key as shown in the following diagram to increase/decrease the frequency command (F). In this mode, it also can be controlled by UP/DOWN key on the digital keypad.



- Pr.02-09 set to 1: it will increase/decrease frequency command (F) by the setting of acceleration/deceleration (Pr.01-12~01-19) and only be valid during operation.



02 - 11 MFI Response Time

Factory Setting: 0.005

Settings 0.000~30.000 seconds

- This parameter is to set the response time of digital input terminals FWD, REV and MI1~MI8.

- It is for digital input terminal signal delay and confirmation. The delay time is confirmation time to prevent some uncertain interference that would cause error in the input of the digital terminals. Under this condition, confirmation for this parameter would improve effectively, but the response time will be somewhat delayed.

02 - 12 Multi-function Input Mode Selection

Factory Setting: 0

Settings 0~65535 (0:N.O.; 1:N.C.)

- The setting of this parameter is in hexadecimal.
- This parameter is to set the input signal level and it won't be affected by the SINK/SOURCE status.
- Bit0 is for FWD terminal, bit1 is for REV terminal and bit2 to bit15 is for MI1 to MI14.
- User can change terminal status by communicating.
  For example, MI1 is set to 1 (multi-step speed command 1), MI2 is set to 2 (multi-step speed command 2). Then the forward + 2nd step speed command=1001(binary)= 9 (Decimal). Only need to set Pr.02-12=9 by communication and it can forward with 2nd step speed. It doesn't need to wire any multi-function terminal.

Bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
MI14	MI13	MI12	MI11	MI10	MI9	MI8	MI7	MI6	MI5	MI4	MI3	MI2	MI1	REV	FWD

02 - 13 Relay1: Multi Output Terminal

Factory Setting: 11

02 - 14 Relay2: Multi Output Terminal

Factory Setting: 1

02 - 15 Relay3: Multi Output Terminal

Factory Setting: 9

02 - 16 Multi-output Direction

Factory Setting: 0

Settings 0~65535 (0:N.O.; 1:N.C.)

- The setting of this parameter is in hexadecimal.
- This parameter is set via bit setting. If a bit is 1, the corresponding output acts in the opposite way. For example: If Pr02-13=1, Relay 1 is open when the drive runs and is closed when the drive is stopped

Bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
MO20	MO19	MO18	MO17	MO16	MO15	MO14	MO13	MO12	MO11	MO10	MO2	MO1	??	RY2	RY1

02 - 17 Terminal count value attained (returns to 0)

Factory Setting: 0

Settings 0~65500

- The counter trigger can be set by the multi-function terminal MI6 (set Pr.02-06 to 23). Upon completion of counting, the specified output terminal will be activated (Pr.02-13~02-14, Pr.02-34, 02-35 is set to 18). Pr.02-17 can't be set to 0.
- When the display shows c5555, the drive has counted 5,555 times. If display shows c5555l it means that real counter value is between 55,550 to 55,559.

t

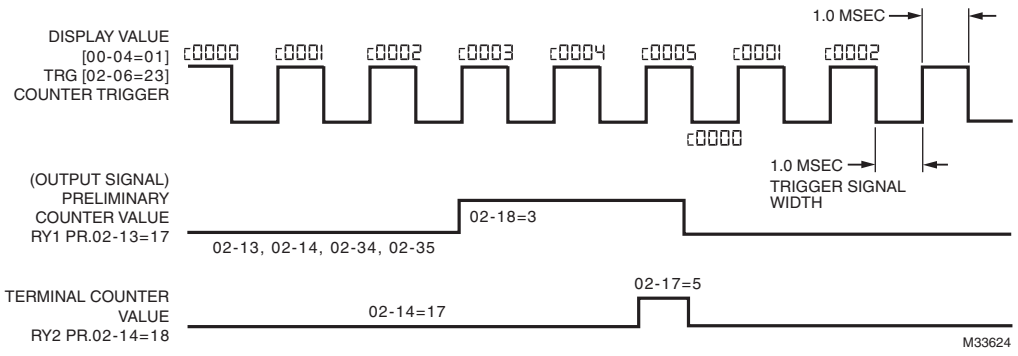
02 - 18 Preliminary count value attained (not return to 0)

Factory Setting: 0

Settings 0~65500

- When the counter value counts from 1 and reaches this value, the corresponding multi-function output terminal will be activated, provided one of Pr. 02-13, 02-14, 02-34, 02-35 set to 17 (Preliminary Count Value Setting). This parameter can be used for the end of the counting to make the drive runs from the low speed to stop.

See the sequence diagram below:



02 - 19 Digital Output Gain (DFM)

Factory Setting: 1

Settings 1~166

- It is used to set the signal for the digital output terminals (DFM-DCM) and digital frequency output (pulse X work period=50%). Output pulse per second = output frequency X Pr.02-19.

02 - 20 Desired Frequency Attained 1

Factory Setting: 60.00/50.00

Settings 0.00~600.00Hz

02 - 22 Desired Frequency Attained 2

Factory Setting: 60.00/50.00

Settings 0.00~600.00Hz

02 - 21 The Width of the Desired Frequency Attained 1

Factory Setting: 2.00

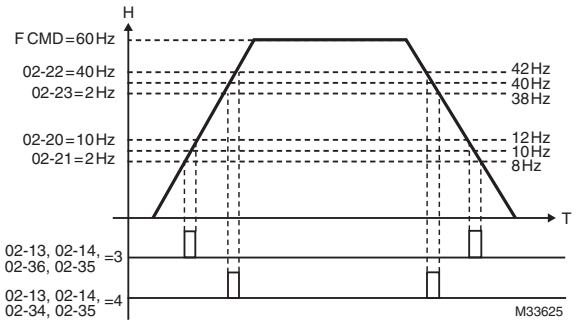
Settings 0.00~600.00Hz

02 - 23 The Width of the Desired Frequency Attained 2

Factory Setting: 2.00

Settings 0.00~600.00Hz

- Once output frequency reaches desired frequency and the corresponding multi-function output terminal is set to 3 or 4 (Pr.02-13, 02-14, 02-34, and 02-35), this multi-function output terminal will be ON.



02 - 26 Input terminal of I/O extension card (MI10)
02 - 27 Input terminal of I/O extension card (MI11)
02 - 28 Input terminal of I/O extension card (MI12)
02 - 29 Input terminal of I/O extension card (MI13)

Factory Setting: 0

Settings

0: No function

1: multi-step speed command 1

2: multi-step speed command 2

3: multi-step speed command 3

4: multi-step speed command 4

5: Reset

6: JOG command by digital keyboard or external control

7: acceleration/deceleration speed not allow

8: the 1st, 2nd acceleration/deceleration time selection

9: the 3rd, 4th acceleration/deceleration time selection

10: EF Input (Pr.07-19)

11: B.B input from external (Base Block)

12: Output stop

14: switch between motor 1 and motor 2

15: operation speed command from AVI1

16: operation speed command from ACI

17: operation speed command from AVI2

18: Emergency stop (Pr.07-19)

19: Digital up command

20: Digital down command

21: PID function disabled

22: Clear counter

23: Input the counter value (MI6)

24: FWD JOG command

25: REV JOG command

26: Reserved

27: ASR1/2 (not valid for Honeywell VFD CORE)

28: Emergency stop (EF1)

29: Signal confirmation for Y-connection

30: Signal confirmation for D-connection

38: Disable write EEPROM function

40: Enforced coast to stop

41: HAND switch

42: AUTO switch

44~47: Reserved

49: Drive enabled

51: Selection for PLC mode bit 0

52: Selection for PLC mode bit 1

53: Triggered CANOpen quick stop

54: UVW Magnetic Contactor On/OFF

55: Confirmation signal of the released brake

56: Max. Reverse Disabled

57: Max. Forward Disabled

58: Enable fire mode (with RUN Command)

59: Enable fire mode (without RUN Command)

60: Disable all the motors

61: Disable Motor#1

62: Disable Motor#2

63: Disable Motor#3

64: Disable Motor#4 disabled

65: Disable Motor #5 disabled

66: Disable Motor#6 disabled

67: Disable Motor#7 disabled

68: Disable Motor#8 disabled

- This parameter selects the functions for each multi-function terminal.
- Parameter 02-24 to 02-29 will be physical input terminals after expansion cards are installed. If there is no expansion cards installed, these parameters remain virtual terminals. For example, after installing the multiple function expansion card “EMC-D42A”, Parameter 02-24 to 02-27 are defined as corresponding parameters for terminals MI10 to MI13. But Parameters 02-28 to 02-31 are still virtual terminals.
- When terminals are defined as virtual, you need a digital keypad or a communication mode to modify status of bit 8~15 (0 means ON, 1 means OFF) at Parameter 02-12.
- If the setting of the Parameter 02-00 is "2: 3 wire mode," then the terminal MI 1 becomes a STOP contact. So the function which was set at this terminal is automatically disabled.

Table of Functions

[For Normally Open (N.O.) Contacts. ON means contact is CLOSED; OFF means contact is OPEN.]

Table 1. Table of Functions

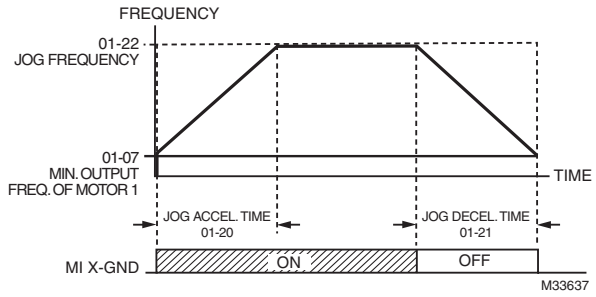
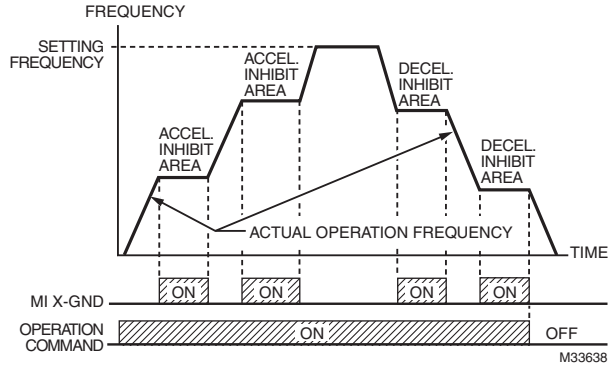
Settings	Functions	Descriptions
0	No Function	
1	Multi-step **speed** command **1** / Multi-step **position** command 1	15-step speeds or 15-step positions could be conducted through the digital status of the 4 terminals. It will be 16 in total if the master speed is included. (Refer to Parameter set 4)
2	Multi-step **speed** command 2 / Multi-step **position** command 2	
3	Multi-step **speed** command 3 / Multi-step position command 3	
4	Multi-step **speed** command 4 / Multi-step **position** command 4	
5	Reset	After the error of the drive is eliminated, use this terminal to reset the drive.
6	JOG Command	Before executing this function, wait for the drive stop completely. While the drive is running, the operating direction can be modified and STOP key on the keypad is still valid. Once the external terminal receives OFF command, the motor will stop by the JOG deceleration time. Refer to Pr.01-20~01-22 for details. 
7	Acceleration / Deceleration Speed Inhibit	When this function is enabled, the acceleration and deceleration are stopped right away. After this function is disabled, the VFD re-starts to accel./decel. from the inhibiting point. 
8	The 1st, 2nd acceleration or deceleration time selection	The acceleration/deceleration time of the drive can be selected from this function or the digital status of the terminals; there are 4 acceleration/deceleration speeds in total for selection.
9	The 3rd, 4th acceleration or deceleration time selection	

Table 1. Table of Functions (Continued)

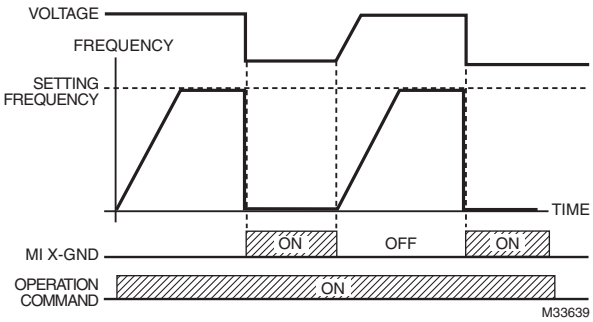
10	EF Input (EF: External Fault)	External fault input terminal. It decelerates by Pr.07-19 setting (If there is any External Fault, it will be saved in an error log)
11	External B.B. Input (Base Block)	When this contact is ON, output of the drive will be cut off immediately, and the motor will be free run and display B.B. signal. Refer to Pr.07-07 for details.
12	Output stop	If this contact is ON, output of the drive will be cut off immediately, and the motor will then be free run. Once it is turned to OFF, the drive will accelerate to the setting frequency. 
13	Cancel the setting of the optimal accel./decel. time	Before using this function, Pr.01-36 should be set to mode 01, 02, 03 or 04 first. When this function is enabled, OFF is for auto mode and ON is for linear accel./decel.
14	Switch between drive settings 1 and 2	When the contact is ON: use parameters of motor 2. When it is OFF: use parameters of motor 1.
15	Operation speed command form AVI1	When the contact is ON, the source of the frequency has to be from AVI1. (If the operation speed commands are set to AVI1, ACI and AVI2 at the same time. The priority is AVI1, ACI, AVI2)
16	ACI Operation speed command form ACI	When the contact is ON, the source of the frequency has to be from ACI. (If the operation speed commands are set to AVI1, ACI and AVI2 at the same time. The priority is AVI1, ACI, AVI2)
17	Operation speed command form AVI2 I	When this function is enabled, the source of the frequency has to be from AVI2. (If the operation speed commands are set to AVI1, ACI and AVI2 at the same time. The priority is AVI1, ACI, AVI2)
18	Emergency Stop (07-19)	When the contact is ON, the drive will ramp to stop by setting of Pr.07-19.
19	Digital Up command	When the contact is ON, the frequency of the drive will be increased or decreased by one unit (Parameter 02-00). If this function is constantly ON, the frequency will be increased or decreased by setting of Pr.02-09 or Pr.02-10.
20	Digital Down Command	
21	PID function disabled	When the contact is ON, the PID function is disabled
22	Clear counter	When the contact is ON, it will clear current counter value and display “0”. Only when this function is disabled, it will keep counting upward.
23	Input the counter value (multi-function input command 6)	The counter value will increase 1 once the contact is ON. It needs to be used with Pr.02-17.
24	FWD JOG command	When the contact is ON, the drive will execute forward Jog command. When execute JOG command under torque mode, the drive will automatically switch to speed mode; after JOG command is done, the drive will return to torque mode.
25	REV JOG command	When the contact is ON the drive will execute reverse Jog command. When execute JOG command under torque mode, the drive will automatically switch to speed mode; after JOG command is done, the drive will return to torque mode.

Table 1. Table of Functions (Continued)

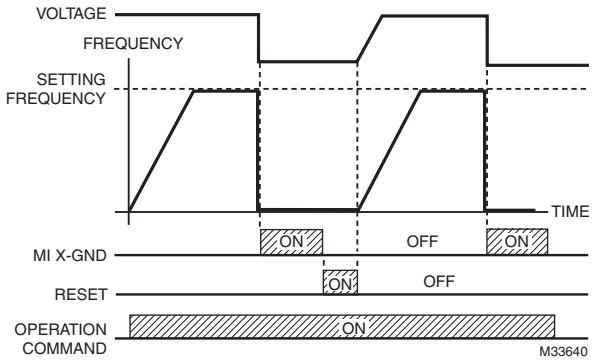
<table>
<tr><td>28</td><td>Emergency stop (EF1)</td><td>When the contact is ON, the drive will execute emergency stop and display EF1 on the keypad. The motor stays in the free run until the error is cleared. (terminal's status is back to normal). Only after pressing RESET" (EF: External Fault), the motor can continue to run.
 
</td></tr>
<tr><td>29</td><td>Signal confirmation for Y-connection</td><td>When the control mode is V/F and the contact is ON, the drive will operate by following the 1st V/F.</td></tr>
<tr><td>30</td><td>Signal confirmation for ? connection</td><td>When the control mode is V/F and contact is ON, the drive will operate by following the 2nd V/F.</td></tr>
<tr><td>38</td><td>Disable EEPROM write function</td><td>When this contact is ON, write to EEPROM is disabled.</td></tr>
<tr><td>40</td><td>Enforced coast to stop</td><td>When this contact is ON during an operation, the drive will free run to stop.</td></tr>
<tr><td>41</td><td>HAND switch</td><td rowspan="2">• When multi-function input terminal is switched OFF, it executes a STOP command. That means when switching to OFF during the operation, the drive will also stop.
• When switching by the keypad during an operation, the drive will be switched to the status after stop.
• When a command is entered via a keypad, the drive will stop for few seconds then switch to the status in accordance with that command.
• Digital keypad displays the drive's status such as HAND/OFF/AUTO
<table><tr><th></th><th>Bit 1</th><th>Bit 0</th></tr><tr><td>Off</td><td></td><td></td></tr><tr><td>Auto</td><td></td><td></td></tr><tr><td>Hand</td><td></td><td></td></tr><tr><td>Off</td><td></td><td></td></tr></table></td></tr>
<tr><td>42</td><td>AUTO switch</td></tr>
<tr><td>44~47</td><td colspan="2">Reserved</td></tr>
<tr><td>49</td><td>Drive enabled</td><td>When drive = Enabled, RUN command is valid.
When drive = Disabled, RUN command is invalid.
When drive is in an Operation, motor coast to stop.</td></tr>
<tr><td>51</td><td>Selection for PLC mode bit0</td><td rowspan="2"><table><tr><th>PLC Status</th><th>Bit 1</th><th>Bit 0</th></tr><tr><td>Disable PLC function (PLC 0)</td><td>0</td><td>0</td></tr><tr><td>Trigger PLC to operation (PLC 1)</td><td>0</td><td>1</td></tr><tr><td>Disable PLC to stop (PLC 2)</td><td>1</td><td>0</td></tr><tr><td>No function</td><td>1</td><td>1</td></tr></table></td></tr>
<tr><td>52</td><td>Selection for PLC mode bit1</td></tr>
</table>

Table 1. Table of Functions (Continued)

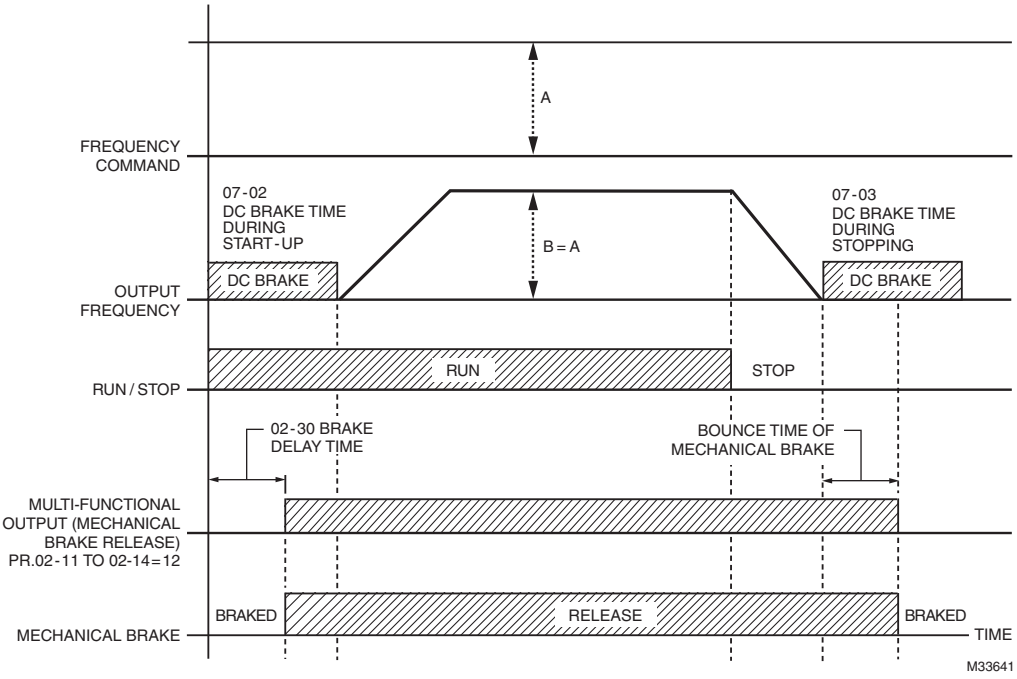
53	Triggered CANopen quick stop	When this function is triggered under CANopen control, the drive will change its status to quick stop.
	UVW magnetic contactor ON/ OFF	To receive confirmation signals while there is UVW magnetic contactor during output.
55	Confirmation signal of released brake	When a motor has a mechanical brake, this function is to confirm a brake has been released.
56	Max. Reverse Disabled	To set maximum value while Reverse and Forward operations have a limit switch to do reciprocating actions.
57	Max. Forward Disabled	
58	Enable fire mode **with** RUN Command	Enable this function under fire mode to force the drive to run (while there **is** RUN COMMAND).
59	Enable fire mode **without** RUN Command	Enable this function under fire mode to force the drive to run (while there **isn't** RUN COMMAND).
60	Disable all the motors	
61	Disable Motor#1	If any of Auxiliary Motor#1 to Motor#8 is out of order or under maintenance, enable this terminal to bypass that motor.
62	Disable Motor#2	
63	Disable Motor#3	
64	Disable Motor#4	
65	Disable Motor#5	
66	Disable Motor#6	
67	Disable Motor#7	
68	Disable Motor#8	

02 - 30 Brake Delay Time

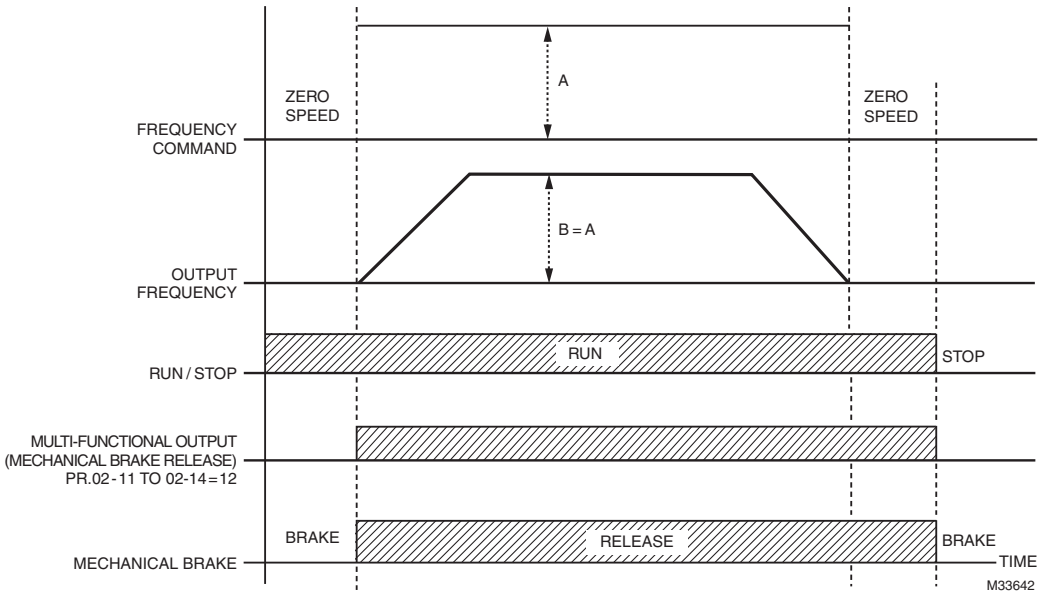
Factory Setting: 0.000

Settings 0.000~65.000 seconds

- When the VFD runs after Pr.02-30 delay time, the corresponding multi-function output terminal (12: mechanical brake release) will be ON. It is recommended to use this function with DC brake.



- If this parameter is applied without DC brake, it will be invalid. Refer to the following operation timing.



02 - 31 Output Current Level Setting for Multi-function Output Terminals

Factory Setting: 0

Settings 0~100%

- When output current is larger or equal to Pr.02-31, it will activate multi-function output terminal (Pr.02-13, 02-14, 02-16, and 02-17 is set to 27).
- When output current is smaller than Pr.02-31, it will activate multi-function output terminal (Pr.02-13, 02-14, 02-16, 02-17 is set to 28).

02 - 32 Output Boundary for Multi-function Output Terminals

Factory Setting: 0.00

Settings 0.00~±60.00Hz

- When output frequency is higher than Pr.02-32, it will activate the multi-function terminal (Pr.02-13, 02-14, 02-16, 02-17 is set to 29).
- When output frequency is lower than Pr.02-32, it will activate the multi-function terminal (Pr.02-13, 02-14, 02-16, 02-17 is set to 30).

02 - 33 External Operation Control Selection after Reset and Activate

Factory Setting: 1

Settings 0: Disable

1: Drive runs if the run command still exists after reset or re-boots.

- Setting 1:
  - Status 1: After the drive is powered on and the external terminal for RUN keeps ON, the drive will run.
  - Status 2: After clearing fault once a fault is detected and the external terminal for RUN keeps ON, the drive can run after pressing RESET key.

02 - 36 Expansion Card Output Terminal (MO3)
02 - 37 Expansion Card Output Terminal (MO4)
02 - 38 Expansion Card Output Terminal (MO5)
02 - 39 Output terminal of the I/O extension card (MO6)
02 - 40 Output terminal of the I/O extension card (MO7)
02 - 41 Output terminal of the I/O extension card (MO8)
02 - 42 Output terminal of the I/O extension card (MO9)
02 - 43 Output terminal of the I/O extension card (MO10)
02 - 44 Output terminal of the I/O extension card (MO11)

Factory Setting: 0

Settings:

0: No function

1: Operation Indication

2: Operation speed attained

3: Desired Frequency Attained 1 (Parameter 02-20)

4: Desired Frequency Attained 2 (Parameter 02-22)

5: Zero speed (Frequency command)

6: Zero speed, include STOP (Frequency command)

7: Over torque 1

8: Over torque 2

9: Drive is ready

10: Low voltage warning: LV (Pr.06-00)

11: Malfunction indication

12: Mechanical brake release (Pr.02-30)

13: Overheat warning (Pr.06-14)

14: Software brake signal indication (Pr.07-00)

15: PID feedback error

16: Slip error (oSL)

17: Terminal count value attained, does not return to 0 (Pr.02-18)

18: Preliminary count value attained, returns to 0 (Pr.02-17)

19: Base block

20: Warning output

21: Over voltage warning

22: Over-current stall prevention warning

23: Over-voltage stall prevention warning

24: Operation mode indication

25: Forward command

26: Reverse command

27: Output when current >= Pr.02-31 (>= 02-31)

28: Output when current ≤Pr.02-31 (≤ 02-31)

29: Output when frequency >= Pr.02-32 (>= 02-32)

30: Output when frequency ≤ Pr.02-32 (≤02-32)

31: Y-connection for the motor coil

32: D-connection for the motor coil

33: Zero speed (actual output frequency)

34: Zero speed include stop (actual output frequency)

35: Error output selection 1(Pr.06-22)

36: Error output selection 2(Pr.06-23)

37: Error output selection 3(Pr.06-24)

38: Error output selection 4(Pr.06-25)

40: Speed attained (including Stop)

44: Low current output

45: UVW Magnetic Contactor enabled

47: Brake output closed

50: Output for CANopen control

51: Output for RS485

52: Output for communication card

53: Fire mode indication

54: Bypass fire mode indication

55: Motor #1 Output

56: Motor #2 Output

57: Motor #3 Output

58: Motor#4 Output

59: Motor#5 Output

60: Motor #6 Output

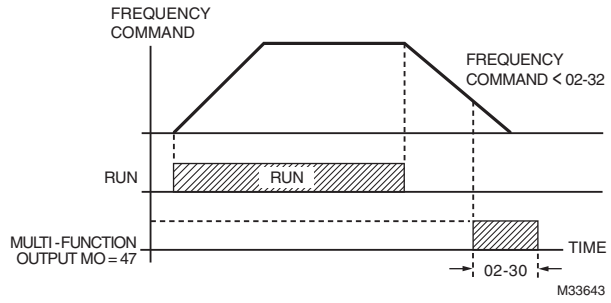
61: Motor#7 Output

62: Motor#8 Output

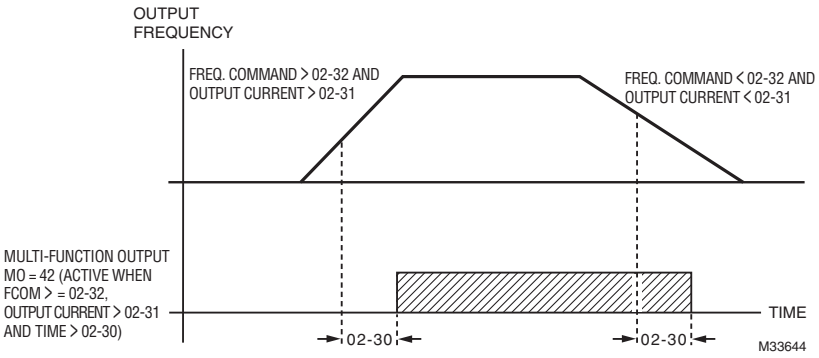
- This parameter selects the functions for each multi-function terminal.
- The terminals of Pr.02-34~Pr.02-39 will only be displayed after using with optional card I/O Extension Card and Relay Extension Card. These cards are available only by special order.

- The optional card I/O Extension Card offers 2 output terminals and can be used with Pr.02-34~02-35.
- The optional card Relay Extension Card offers 6 output terminals and can be used with Pr.02-34~02-39
- Summary of function settings (Take the normally open contact for example, ON: contact is closed, OFF: contact is open)

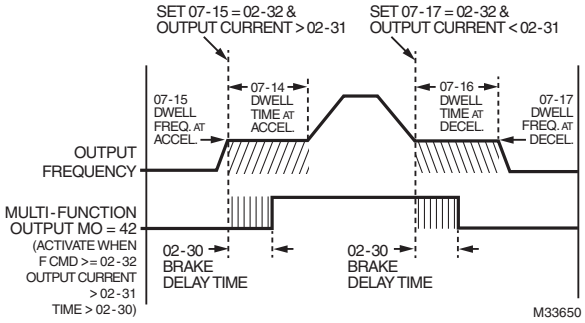
Settings	Functions	Descriptions
0	No Function	This terminal has no function.
1	Operation Indication	Active when the drive is not at STOP.
2	Master Frequency Attained	Active when the VFD reaches the output frequency setting.
3	Desired Frequency Attained 1 (Pr.02-20)	Active when the desired frequency (Pr.02-20) is attained.
4	Desired Frequency Attained 2 (Pr.02-22)	Active when the desired frequency (Pr.02-22) is attained.
5	Zero Speed (frequency command)	Active when frequency command =0. (the drive should be at RUN mode)
6	Zero Speed with Stop (frequency command)	Active when frequency command =0 or stop.
7	Over Torque 1	Active when detecting over-torque. Refer to Pr.06-06 (over-torque detection level-OT1) and Pr.06-07 (over-torque detection time-OT1). Refer to Pr.06-05~06-07.
8	Over Torque 2	Active when detecting over-torque. Refer to Pr.06-09 (over-torque detection level-OT2) and Pr.06-10 (over-torque detection time-OT2). Refer to Pr.06-08~06-10.
9	Drive Ready	Active when the drive is ON and no abnormality detected.
10	Low voltage warn (Lv)	Active when the DC Bus voltage is too low. (refer to Pr.06-00 low voltage level)
11	Malfunction Indication	Active when fault occurs (except Lv stop).
12	Mechanical Brake Release (Pr.02-30)	When drive runs after Pr.02-30, it will be ON. This function should be used with DC brake and it is recommended to use contact "b" (N.C).
13	Overheat	Active when IGBT or heat sink overheats to prevent OH turn off the drive. (refer to Pr.06-14)
14	Software Brake Signal Indication	Active when the soft brake function is ON. (refer to Pr.07-00)
15	PID Feedback Error	Active when the feedback signal is abnormal.
16	Slip Error (oSL)	Active when the slip error is detected.
17	Terminal Count Value Attained (Pr.02-18; not return to 0)	Active when the counter reaches Terminal Counter Value (Pr.02-17). This contact won't active when Pr.02-18>Pr.02-17.
18	Preliminary Counter Value Attained (Pr.02-17; returns to 0)	Active when the counter reaches Preliminary Counter Value (Pr.02-17).
19	External Base Block input (B.B.)	Active when the output of the VFD is shut off during base block.
20	Warning Output	Active when the warning is detected.
21	Over-voltage Warning	Active when the over-voltage is detected.
22	Over-current Stall Prevention Warning	Active when the over-current stall prevention is detected.
23	Over-voltage Stall prevention Warning	Active when the over-voltage stall prevention is detected.
24	Operation Mode Indication	Active when the operation command is controlled by external terminal (Pr.00-14≠0)
25	Forward Command	Active when the operation direction is forward.
26	Reverse Command	Active when the operation direction is reverse.
27	Output when Current ≥ Pr.02-31	Active when current is ≥ Pr.02-31.
28	Output when Current ≤ Pr.02-31	Active when current is ≤ Pr.02-31.
29	Output when frequency ≥ Pr.02-32	Active when frequency is ≥ Pr.02-32.

30	Output when Frequency ≤ Pr.02-32	Active when frequency is ≤ Pr.02-32.
31	Y-connection for the Motor Coil	Active when PR.05-24 is less than Pr.05-23 and time is more than Pr.05-25.
32	D-connection for the Motor Coil	Active when PR.05-24 is higher than Pr.05-23 and time is more than Pr.05-25.
33	Zero Speed (actual output frequency)	Active when the actual output frequency is 0. (the drive should be at RUN mode)
34	Zero Speed with Stop (actual output frequency)	Active when the actual output frequency is 0 or Stop.
35	Error Output Selection 1 (Pr.06-22)	Active when Pr.06-22 is ON.
36	Error Output Selection 2 (Pr.06-23)	Active when Pr.06-23 is ON.
37	Error Output Selection 3 (Pr.06-24)	Active when Pr.06-24 is ON.
38	Error Output Selection 4 (Pr.06-25)	Active when Pr.06-25 is ON.
40	Speed Attained (including zero speed)	Active when the output frequency reaches frequency setting or stop
44	Low Current Output	This function needs to be used with Pr.06-61 ~ Pr.06-63
45	UVW Magnetic Contactor enabled	
47	Brake Released at Stop	When drive stops, the corresponding multi-function terminal will be ON if the frequency is less than Pr.02-32. After it is ON, it will be OFF when brake delay time exceeds Pr.02-30. 
50	Output for CANopen control	For CANopen communication output
51	Output for RS-485	For RS-485 output
52	Output for communication card	For Modbus TC/IP Communication Card, Ethernet I/P Communication Card, and communication control to do output

Example of crane function



It is recommended to be used with Dwell function as shown in the following:



02 - 45 Max. Frequency of Resolution Switch

Factory Setting: 60.00

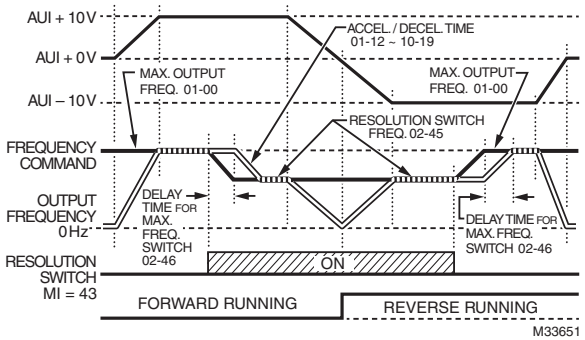
Settings 0.01~600.00Hz

02 - 46 Switch the delay time of Max. output frequency

Factory Setting: 0.000

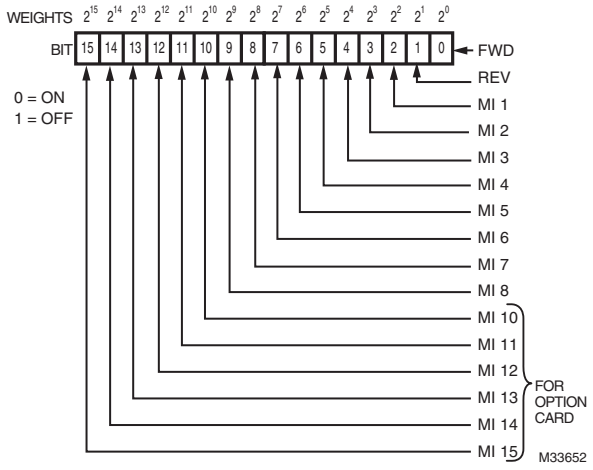
Settings 0.000~65.000 seconds

- It is to improve the unstable speed or unstable position due to insufficiency of analog resolution. It needs to be used with external terminal (set to 43). After setting this parameter, it needs to adjust the analog output resolution of controller simultaneously by this setting.

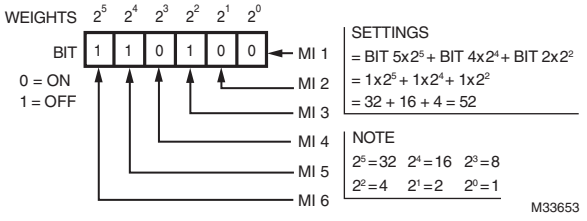


02 - 47 Display the Status of Multi-function Input Terminal

Factory Setting: Read Only



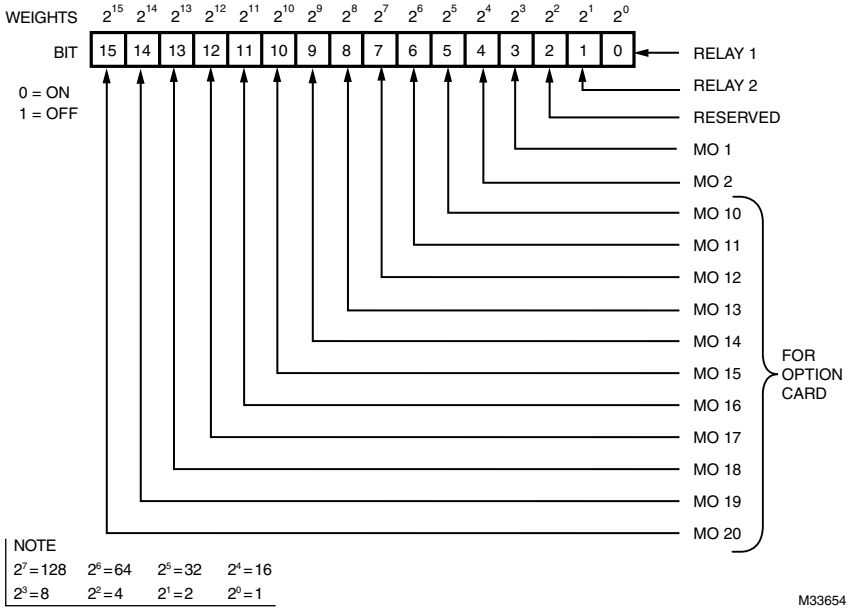
- For Example:
  If Pr.02-47 displays 0034h (Hex), i.e. the value is 52, and 110100 (binary). It means MI1, MI3 and MI4 are active.



02 - 48 Status of Multi-function Output Terminal

Factory Setting: Read Only

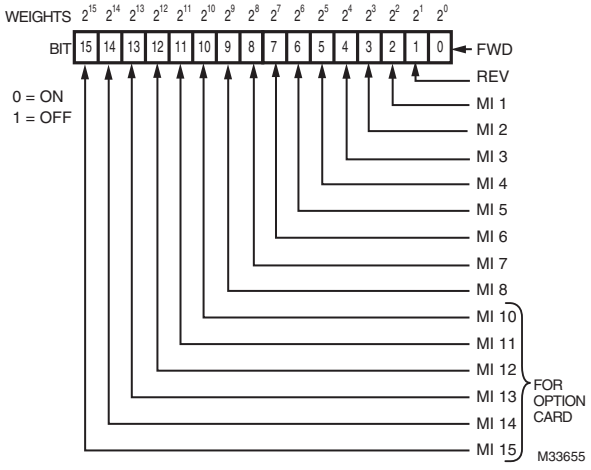
- For Example:
  If Pr.02-48 displays 000Bh (Hex), i.e. the value is 11, and 1011 (binary). It means RY1, RY2 and MO1 are ON.



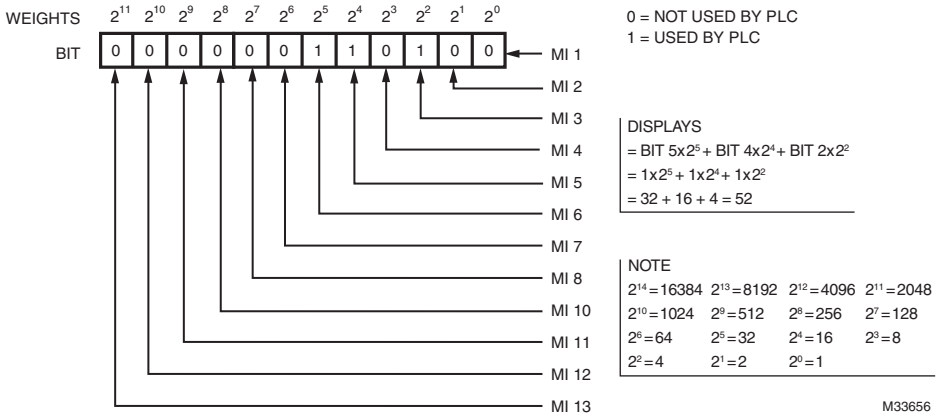
02 - 49 Display External Output terminal occupied by PLC

Factory Setting: Read Only

- P.02-49 shows the external multi-function input terminal used by PLC.



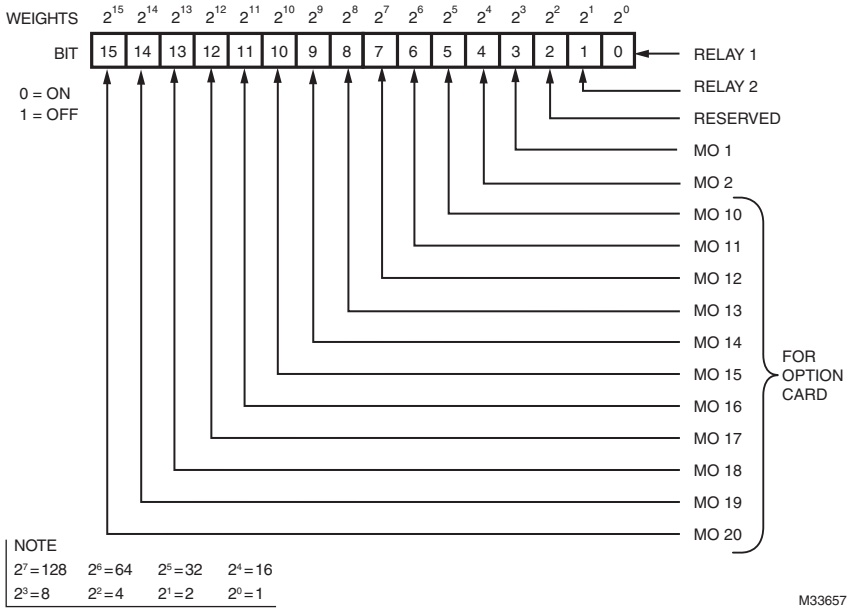
- For Example: When Pr.02-49 displays 0034h (hex) and switching to 110100 (binary), it means MI1, MI3 and MI4 are used by PLC



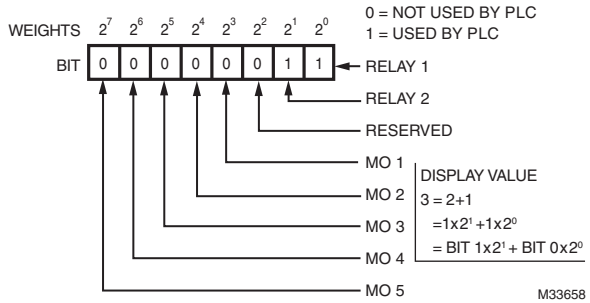
02- 50 Display Analog Input Terminal occupied by PLC

Factory Setting: Read Only

- Pr.02-50 shows the external multi-function output terminal that used by PLC.



- For example: If the value of Pr.02-50 displays 0003h (Hex), it means RY1and RY2 are used by PLC.



02 - 51 Display the Frequency Command Memory of External Terminal

Factory Setting: Read Only

Settings Read Only

- When the source of frequency command comes from the external terminal, if Lv or Fault occurs at this time, the frequency command of the external terminal will be saved in this parameter.

02 - 52 Mix Active by Internal or External

Factory Setting: 0

Settings 0~65535

02 - 53 Internal Mix Active Value

Factory Setting: 0

Setings 0~65535

03 Analog Input/Output Parameter ~ The parameter can be set during operation

03 - 00 Analog Input 1 (AVI1)

Factory Setting: 1

03 - 01 Analog Input 2(ACI)

Factory Setting: 0

03 - 02 Analog Input 3 (AVI2)

Factory Setting: 0

Settings

0: No function

1: Frequency command

4: PID target value (Refer to Group 8)

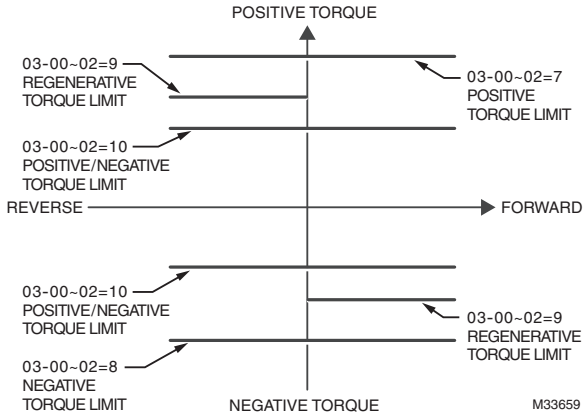
5: PID feedback signal (Refer to Group 8)

6: PTC thermistor input value

11: PT100 thermistor input value

12~17: Reserved

- When it is frequency command or TQC speed limit, the corresponding value for 0~±10V/4~20mA is 0 – max. output frequency (Pr.01-00)



03 - 03 Analog Input Bias 1 (AVI1)

Factory Setting: 0

Settings -100.0~100.0%

- It is to set the corresponding AVI1 voltage of the external analog input 0.

03 - 04 Analog Input Bias 1 (ACI)

Factory Setting: 0

Settings -100.0~100.0%

- It is used to set the corresponding ACI voltage of the external analog input 0.

03 - 05 AVI2 Analog Positive Input Bias

Factory Setting: 0

Settings -100.0~100.0%

- It is used to set the corresponding AVI2 voltage of the external analog input 0.
- The relation between external input voltage/current and setting frequency: 0~10V (4-20mA) corresponds to 0-60Hz.

03 - 06 Positive/negative Bias Mode (AVI1)
03 - 07 Positive/negative Bias Mode (ACI)
03 - 08 Positive/negative Bias Mode (AVI2)

Factory Setting: 0

Settings 0: Zero bias

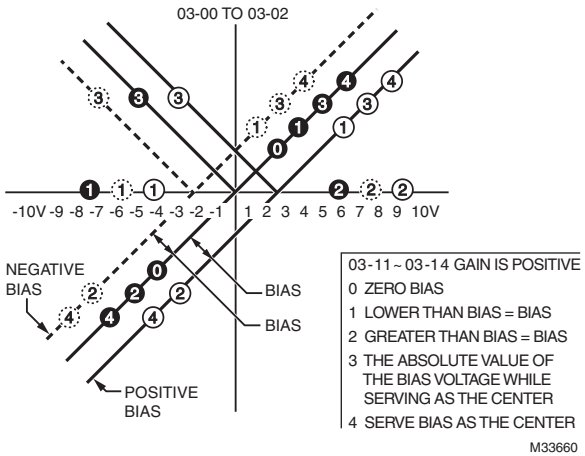
1: Lower than bias=bias

2: Greater than bias=bias

3: The absolute value of the bias voltage while serving as the center

4: Serve bias as the center

- In a noisy environment, it is advantageous to use negative bias to provide a noise margin. It is recommended NOT to use less than 1V to set the operation frequency.



Repartir

03 - 09 Analog Input Gain 1 (AVI1)
03 - 10 Analog Input Gain 2 (ACI)
03 - 11 Analog Positive Input Gain 3 (AVI2)
03 - 12 Analog Input Filter Time (AVI1)
03 - 13 Analog Input Filter Time (ACI)
03 - 14 Analog Input Filter Time (AVI2)

Factory Setting: 0.01

Settings 0.00~20.00 seconds

- These input delays can be used to filter noisy analog signal
- When the setting of the time constant is too large, the control will be stable but the control response will be slow. When the setting of time constant is too small, the control response will be faster but the control may be unstable. To find the optimal setting, please adjust the setting according to the control stable or response status.

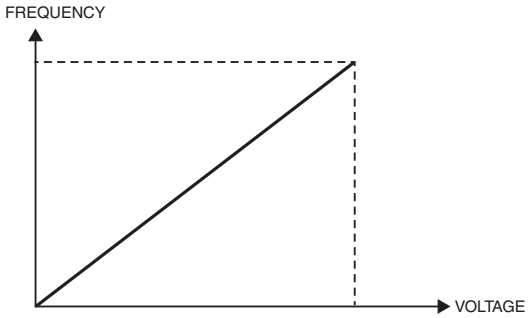
03 - 15 Addition Function of the Analog Input

Factory Setting: 0

Settings 0: Disable (AVI1, ACI, AVI2)

1: Enable

- When Pr.03-15 is set to 0 and the analog input setting is the same, the priority for AVI1, ACI and AVI2 are AVI1>ACI>AVI2.



$$\text{F COMMAND} = [(\text{AY} \pm \text{BIAS}) * \text{GAIN}] * \frac{\text{F MAX (01-00)}}{\text{10V OR 16 mA}}$$

F COMMAND: THE CORRESPONDING FREQUENCY FOR 10V OR 20mA
AY: 10 OR 16mA
BIAS: PR.03-03, PR. 03-04, PR. 03-05
GAIN: PR.03-09, PR. 03-10, PR. 03-11

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03 - 16 Loss of the ACI Signal

Factory Setting: 0

Settings 0: Disable

1: Continue operation at the last frequency

2: Decelerate to stop

3: Top immediately and display ACE

- This parameter determines the behAVI1or when ACI is lost.
- When Pr.03-26 is set to 1, it means ACI terminal is for 0-10V voltage input. At this moment, Pr.03-16 will be invalid.
- When setting is 1 or 2, it will display warning code “AnL” on the keypad. It will be blinking until the loss of the ACI signal is recovered or drive is stop

03 - 17 Multi-function Output 1 (AFM1)

Factory Setting: 0

03 - 18 Gain for Analog Output 1 (AFM1)

Factory Setting: 100.0

03 - 19 Analog Output 1 Value in REV Direction (AFM1)

Factory Setting: 0

03 - 20 Multi-function Output 2 (AFM2)

Factory Setting: 2

Settings 0~23

Table 2. Function Chart

Settings	Functions	Descriptions
0	Output frequency (Hz)	Max. frequency Pr.01-00 is regarded as 100%.
1	Frequency command (Hz)	Max. frequency Pr.01-00 is regarded as 100%.
2	Motor speed (Hz)	600Hz is regarded as 100%
3	Output current (rms)	(2.5 X rated current) is regarded as 100%
4	Output voltage	(2 X rated voltage) is regarded as 100%
5	DC Bus Voltage	450V (900V)=100%
6	Power factor	-1.000~1.000=100%
7	Power	Rated power is regarded as 100%
8	Output torque	Full-load torque is regarded as 100%
9	AVI1 %	0~10V=0~100%
10	ACI %	0~20mA=0~100%
22	Analog output for communication card	For communication output (CMC-MOD01, CMC-EIP01, CMC-PN01, CMC-DN01)
23	Constant voltage output	Voltage output level can be controls by Pr.03-29 and Pr03-33. 0~100% of Pr.03-29 corresponds to 0~10V of AFM1.

03 - 21 Gain for Analog Output 2 (AFM2)

Factory Setting: 100.0

Settings 0~500.0%

- It is used to adjust the analog voltage level (Pr.03-17) that terminal AFM outputs.
- This parameter is set the corresponding voltage of the analog output 0.

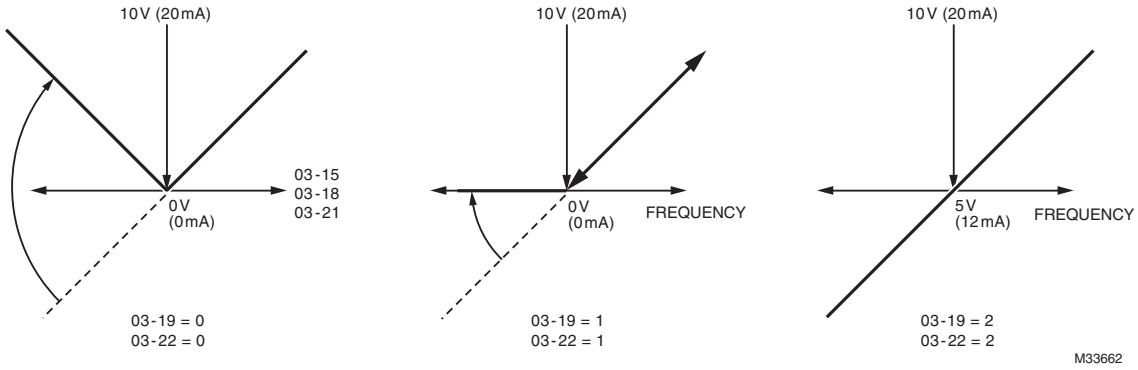
03 - 22 Analog Output 2 Value in REV Direction (AFM2)

Factory Setting: 0

Settings 0: Absolute value in REV direction

1: Output 0V in REV direction; output 0-10V in FWD direction

2: Output 5-0V in REV direction; output 5-10V in FWD direction



Selections for the analog output direction

03 - 23 Display Low-Pass Filter AFM1, AFM1 Filter
03 - 24 Display Low-Pass Filter AFM2, AFM2 Filter

Factory Setting: 0

Settings 0.001~65.535 seconds

03 - 25 AVI1 Selection

Factory Setting: 0

Settings 0: 0-10V
1: 0-20mA
2: 4-20mA

03 - 26 ACI Selection

Factory Setting: 0

Settings 0: 4-20mA
1: 0-10V
2: 0-20mA

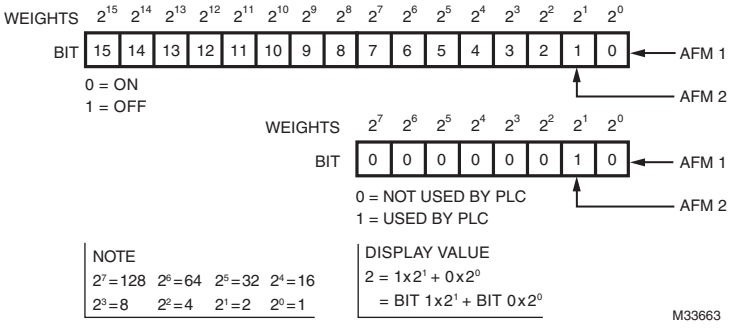
- When changing the input mode, please check if the switch of external terminal (SW3, SW4) corresponds to the setting of Pr.03-25~03-26.

03 - 27 Display Status of PLC Output Terminal

Factory Setting: 0

Settings 0~65535
Monitor the status of PLC analog output terminals

- P.03-27 shows the external multi-function output terminal used by PLC
- For Example:
  If the value of Pr.02-28 displays 0002h (Hex), it means AFM1and AFM2 are used by PLC.



03 - 28 AFM2 0-20mA Output Selection

Factory Setting: 0

Settings 0: 0-20mA output
1: 4-20mA output

03 - 29 AFM1 DC Output Setting Level

03 - 30 AFM2 DC Output Setting Level

Factory Setting: 0.00

Settings 0.00~100.00%

03 - 32 AI calculated selection

Factory Setting: 7

Settings 0 ~ 7

03-33 AVI1 Point1 – V/mA

Factory Setting: 0.00

Setting 0.00 ~ 10.00 / 0.00 ~ 20.00

03-34 AVI1 Point 1- Hz

Factory Setting: 20.00

Setting 0.00 ~ 600.00Hz

03-35 AVI1 Point 2- V/mA

Factory Setting: 10.00/20.00

Setting 0.00 ~ 10.00 / 0.00 ~ 20.00

03-36 AVI1 Point2- Hz

Factory Setting: 60.00

Setting 0.00 ~ 600.00 Hz

03-37 AVI1 Point 3 – V/mA

Factory Setting: 10.00/20.00

Setting 0.00 ~ 10.00 / 0.00 ~ 20.00

03-38 AVI1 Point 3- Hz

Factory Setting: 60.00

Setting 0.00 ~ 600.00Hz

03-39 ACI Point 1 – V/mA

Factory Setting: 0.00/4.00

Setting 0.00 ~ 10.00 / 0.00 ~ 20.00

03-40 ACI Point 1- Hz

Factory Setting: 20.00

Setting 0.00 ~ 600.00Hz

03-41 ACI Point 2 – V/mA

Factory Setting: 10.00/20.00

Setting 0.00 ~ 10.00 / 0.00 ~ 20.00

03-42 ACI Point2 - Hz

Factory Setting: 60.00

Setting 0.00 ~ 600.00Hz

03-43 ACI Point 3 – V/mA

Factory Setting: 10.00/20.00

Setting 0.00 ~ 10.00 / 0.00 ~ 20.00

03-44 ACI Point3 - percent

Factory Setting: 60.00

Setting 0.00 ~ 600.00Hz

03-45 AVI2 Point1 – voltage

Factory Setting: 0V

Setting 0.00 ~ 10.00V

03-46 AVI2 Point 2- Hz

Factory Setting: 0.00

Setting 0.00 ~ 600.00Hz

03-47 AVI2 Point 2- voltage

Factory Setting: 10.00

Setting 0.00 ~ 10.00V

03-48 AVI2 Point2 -Hz

Factory Setting: 60.00

Setting 0.00 ~ 600.00Hz

03-49 AVI2 Point 3- voltage

Factory Setting:10.00V

Setting 0.00 ~ 10.00V

03-50 AVI2 Point 3 - Hz

Factory Setting: 60.00

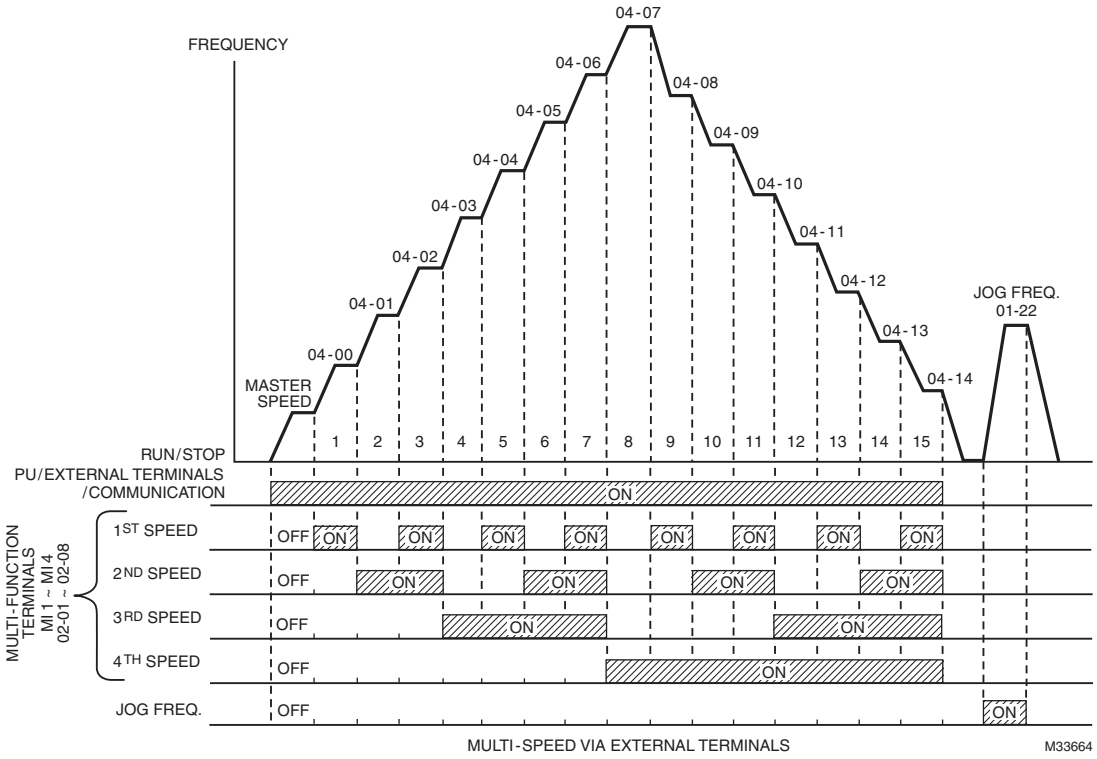
Setting 0.00~600.00Hz

04 Multi-Step Speed Parameters ~ The parameter can be set during operation

	Step Speed Frequency	Factory Setting
04 - 00	1st Step Speed Frequency	30.00
04 - 01	2nd Step Speed Frequency	40.00
04 - 02	3rd Step Speed Frequency	5.50
04 - 03	4th Step Speed Frequency	50.00
04 - 04	5th Step Speed Frequency	5.50
04 - 05	6th Step Speed Frequency	5.50
04 - 06	7th Step Speed Frequency	5.50
04 - 07	8th Step Speed Frequency	60.00
04 - 08	9th Step Speed Frequency	5.50
04 - 09	10th Step Speed Frequency	5.50
04 - 10	11th Step Speed Frequency	5.50
04 - 11	12th Step Speed Frequency	5.50
04 - 12	13th Step Speed Frequency	5.50
04 - 13	14th Step Speed Frequency	5.50
04 - 14	15th Step Speed Frequency	5.50
	Settings 0.00~600.00Hz	

- The Multi-function Input Terminals (refer to setting 1~4 of Pr.02-01~02-08 and 02-24~02-29) are used to select one of the VFD Multi-step speeds (max. 15 speeds). The speeds (frequencies) are determined by Pr.04-00 to 04-14 as shown in the following.
- The run/stop command can be controlled by the external terminal/digital keypad/communication via Pr.00-15.
- Each one of multi-step speeds can be set within 0.0~600.0Hz during operation
- Explanation for the timing diagram for multi-step speeds and external terminals
  The Related parameter settings are:
  1. Pr.04-00~04-14: setting multi-step speeds (to set the frequency of each step speed)
  2. Pr.02-01~02-08, 02-24~02-29: setting multi-function input terminals (multi-step speed 1~4)

- Related parameters: 01-22 JOG Frequency, 02-01 Multi-function Input Command 1 (MI1), 02-02 Multi-function Input Command 2 (MI2), 02-03 Multi-function Input Command 3 (MI3), 02-04 Multi-function Input Command 4 (MI4)


FREQUENCY
04-07
04-06
04-08
04-05
04-09
04-04
04-10
04-03
04-11
04-02
04-12
JOG FREQ.
01-22
04-01
04-13
04-00
04-14
MASTER SPEED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
RUN/STOP
PU/EXTERNAL TERMINALS /COMMUNICATION
ON
MULTI-FUNCTION TERMINALS MI1 ~ MI4 02-01 ~ 02-08
1ST SPEED
2ND SPEED
3RD SPEED
4TH SPEED
JOG FREQ.
OFF
ON
MULTI-SPEED VIA EXTERNAL TERMINALS
M33664

05 Motor Parameters ~ The parameter can be set during operation

05 - 00 Motor Auto Tuning

Factory Setting: 0

Settings 0: No function
1: Measure induction motor in dynamic status (motor spinning)
2: Measure induction motor in static status (motor not spinning)

Induction Motor

- Start auto tuning by pressing the Run key, and the measured value will be written into motor 1 automatically.
- AUTO-Tuning Process (dynamic motor):
  1. Make sure that all the parameters are set to factory settings and the motor wiring is correct.
  2. Make sure the motor has no-load before executing auto-tuning and the shaft is not connected to any belt or gear motor. It is recommended to set to 2 if the motor can't separate from the load.

	Motor 1
Motor Rated Frequency	01-01
Motor Rated Voltage	01-02
Motor Full-load Current	05-01
Motor Rated Power	05-02
Motor Rated Speed	05-03
Motor Pole Numbers	05-04

3. Set Pr.05-00=1 and press the Run key; the drive will begin auto-tuning. Please be aware motor starts spinning when the Run key is pressed.
4. When auto-tuning is complete, please check if the measured values are written into motor 1 automatically.

NOTE: If Pr.05-00 is set to 2, it needs to input Pr.05-05 for motor 1.

NOTES:
1. In torque/vector control mode, it is not recommended to have motors run in parallel.
2. It is not recommended to use torque/vector control mode if motor rated power exceeds the rated power of the VFD

05 - 01 Full-Load Current of Induction Motor 1 (A)

Unit: Ampere
Factory Setting: 0

Settings 10 to 120% of drive's rated current

- This value should be set according to the rated frequency of the motor as indicated on the motor nameplate. The factory setting is 90% X rated current
  Example: The rated current for 7.5HP (5.5kW) is 25 and factory setting is 22.5A. The range for setting will be 10~30A.(25*40%=10A and 25*120%=30A)

05 - 02 Rated Power of Induction Motor 1(kW)

Factory Setting: 0

Settings 0~655.35 kW

- It is used to set rated power of the motor 1. The factory setting is the power of the drive

05 - 03 Rated Speed of Induction Motor 1 (rpm)

Factory Setting:
1710: 60Hz 4 poles
1410: 50Hz 4 poles

Settings 0~65535

- It is used to set the rated speed of the motor and need to set according to the value indicated on the motor nameplate.

05 - 04 Pole Number of Induction Motor 1

Factory Setting: 4

Settings 2~20

- It is used to set the number of motor poles (must be an even number).

05 - 05 No-load Current of Induction Motor 1 (A)

Unit: Ampere
Factory Setting: 0

Settings 0 to the factory setting in Pr.05-01

- Factory setting is 40% of the drive's rated current.

Settings 0~65535

- It is used to set the rated speed of the motor and need to set according to the value indicated on the motor nameplate.

05 - 06 Accumulative Motor Operation Time (Min)

Factory Setting: 0

Settings 0~1439

05 - 07 Accumulative Motor Operation Time (Day)

Factory Setting: 0

Settings 00~1440

- Pr. 05-06 and Pr.05-07 are used to record the motor operation time. They can be cleared by setting to 00 and time won't be recorded when it is less than 60 seconds

06 Protection Parameters ~ The parameter can be set during operation

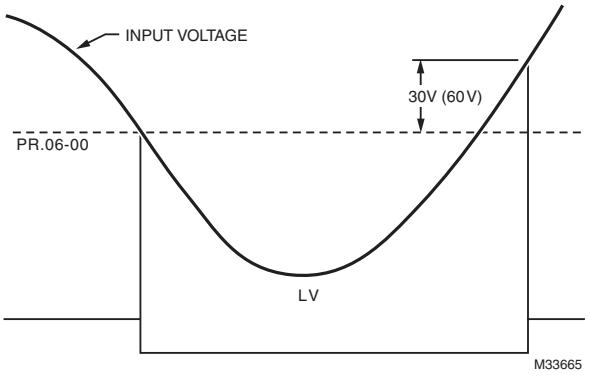
06 - 00 Low Voltage Level

Factory Setting: 180.0/360.0

Settings 230V models: 160.0~220.0V

460V models: 320.0~440.0V

- It is used to set the Lv level. When the drive is in the low voltage, it will stop output and free to stop.



06 - 01 Over-voltage Stall Prevention

Factory Setting: 380.0/760.0

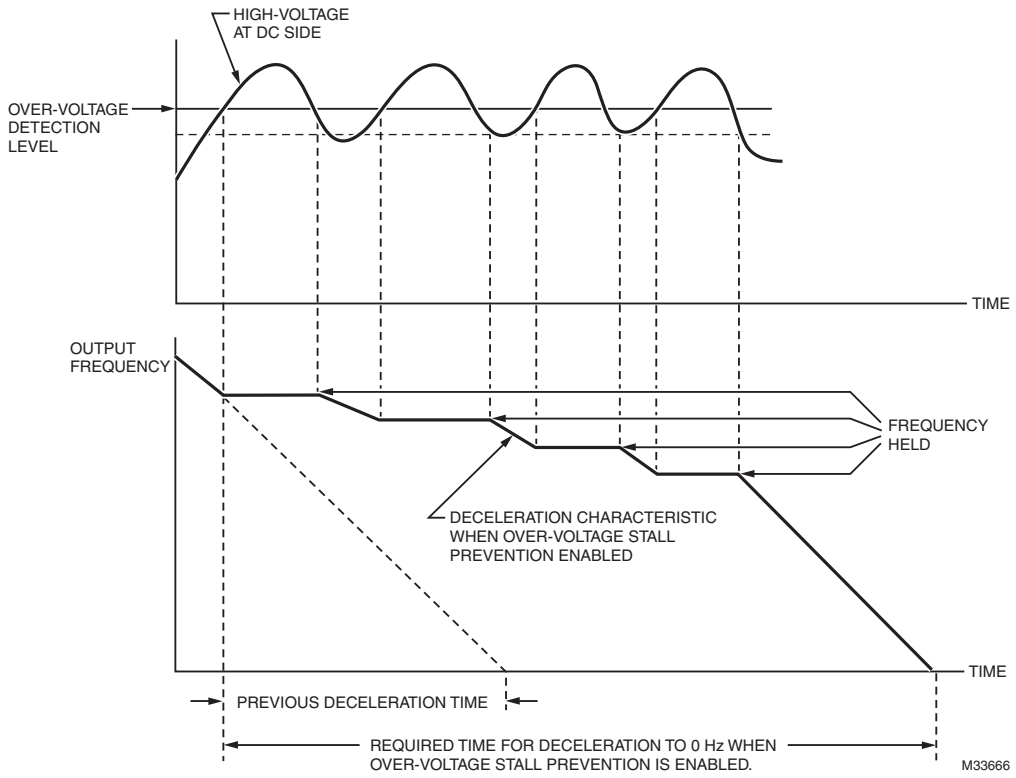
Settings 230V models: 350.0~450.0V

460V models: 700.0~900.0V

0: Disable this function

- When the setting is 0.0, the over-voltage Stall prevention is disabled.
- During deceleration, the DC bus voltage may exceed its Maximum Allowable Value due to motor regeneration. When this function is enabled, the VFD will not decelerate further and keep the output frequency constant until the voltage drops below the preset value again.
- This function is used for the occasion that the load inertia is unsure. When it stops in the normal load, the over-voltage won't occur during deceleration and fulfill the setting of deceleration time. Sometimes, it may not stop due to over-voltage during decelerating to stop when increasing the load regenerative inertia. At this moment, the VFD will auto add the deceleration time until drive stops.
- When the over-voltage stall prevention is enabled, drive deceleration time will be larger than the setting
- When there is any problem as using deceleration time, refer to the following items to solve it.
  1. Add the suitable deceleration time.
  2. Add brake resistor (refer to appendix B-1 for details) to consume the electrical energy that regenerated from the motor with heat type.

- Related parameters: Pr.01-13, 01-15, 01-17, 01-19 (settings of decel. time 1~4), Pr.02-13~02-14 (Multi-function Output 1 RY1, RY2), Pr. 02-16~02-17 Multi-function Output (MO1, 2)

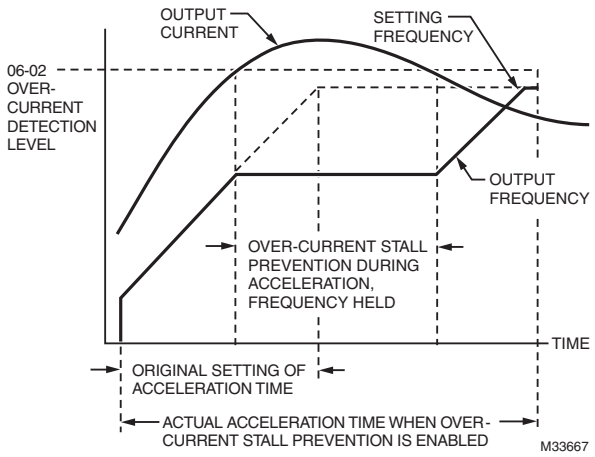


06 - 02 Over-current Stall Prevention during Acceleration

Settings	Heavy duty: 0~160%; 100% drive's rated current	Factory Setting: 120
	Normal duty: 0~130%; 100% drive's rated current	Factory Setting: 120

- If the motor load is too large or drive acceleration time is too short, the VFD output current may increase abruptly during acceleration and it may cause motor damage or trigger protection functions (OL or OC). This parameter is used to prevent this situation
- During acceleration, the VFD output current may increase abruptly and exceed the value specified by Pr.06-02 due to rapid acceleration or excessive load on the motor. When this function is enabled, the VFD will stop accelerating and keep the output frequency constant until the current drops below the maximum value.
- When the over-current stall prevention is enabled, drive deceleration time will be larger than the setting
- When the Over-Current Stall Prevention occurs due to too small motor capacity or in the factory setting, please decrease Pr.06-02 setting.
- When there is any problem by using acceleration time, refer to the following items to solve it

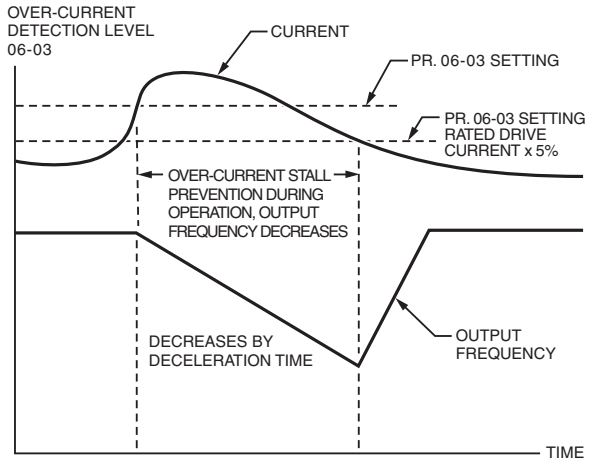
- Related parameters: Pr.01-12, 01-14, 01-16, 01-18 (settings of accel. time 1~4), Pr.01-36
    1. Add the suitable acceleration time.
    2. Related parameters: Pr01-12, 01-14, 01-16, 01-18 for Acceleration Time 1, Time 2, Time 3 and Time 4; Pr.01-36 for Optimal Acceleration/Deceleration Setting to 1, 3 or 4 (auto accel.), Pr.02-13~02-14 for (Multi-function Output 1 RY1, RY2), Pr. 02-16~02-17 for Multi-function Output (MO1, 2)



06 - 03 Over-current Stall Prevention during Operation

Settings	Heavy duty: 0~160%, 100% drive's rated current	Factory Setting: 120%
	Normal duty: 0~130%, 100% drive's rated current	Factory Setting: 120%

- It is a protection for drive to auto decrease output frequency when the motor is over-load abruptly during motor constant operation.
- If the output current exceeds the setting specified in Pr.06-03 when the drive is operating, the drive will decrease its output frequency (according to Pr.06-04) to prevent the motor stall. If the output current is lower than the setting specified in Pr.06-03, the drive will accelerate (according to Pr.06-04) again to catch up with the set frequency command value.



06 - 04 Accel./Decel. Time Selection of Stall Prevention at Constant Speed

Factory Setting: 0

Settings 0: by current accel/decel time
1: by the 1st accel/decel time
2: by the 2nd accel/decel time
3: by the 3rd accel/decel time
4: by the 4th accel/decel time
5: by auto accel/decel

- It is used to set the accel./decel. time selection when stall prevention occurs at constant speed

06 - 05 Over-torque Detection Selection (OT1)

Factory Setting: 0

Settings 0: Disable
1: Over-torque detection during constant speed operation, continue to operate after detection
2: Over-torque detection during constant speed operation, stop operation after detection
3: Over-torque detection during operation, continue to operate after detection
4: Over-torque detection during operation, stop operation after detection

06 - 06 Over-torque Detection Level (OT1)

Factory Setting: 120

Settings 10 to 250% (100%: drive's rated current)

06 - 07 Over-torque Detection Level (OT1

Factory Setting: 0.1

Settings 0.0~60.0 seconds

06 - 08 Over-torque Detection Selection (OT2)

Factory Setting: 0

Settings 0: Disable
1: Over-torque detection during constant speed operation, continue to operate after detection
2: Over-torque detection during constant speed operation, stop operation after detection
3: Over-torque detection during operation, continue to operation after detection
4: Over-torque detection during operation, stop operation after detection

- When Pr.06-05 and Pr.06-08 are set to 1 or 3, it will display a warning message and won't have an abnormal record.
- When Pr.06-05 and Pr.06-08 are set to 2 or 4, it will display a warning message and will have an abnormal record.

06 - 09 Over-torque Detection Level (OT2)

Factory Setting: 120

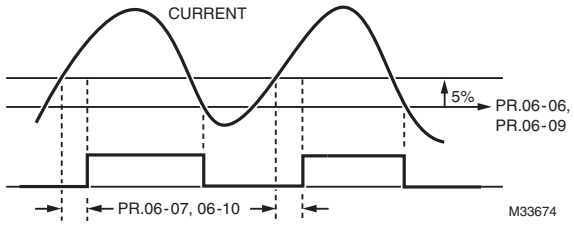
Settings 10~200%, 100% drive's rated current

06 - 10 Over-torque Detection Time (OT2)

Factory Setting: 0.1

Settings 0.0~60.0?

- Over torque detection is determine by the following method: if the output current exceeds the over-torque detection level (Pr.06-06, factory setting: 150%) and also exceeds Pr.06-07 Over-Torque Detection Time, the fault code “ot1/ot2” will appear. If a Multi-Functional Output Terminal is to over-torque detection (setting 7 or 8), the output is on. Please refer to Pr.02-13~02-14 for details.



06 - 11 Maximum Current Limit

Factory Setting: 170

Settings 0~250%, 100% drive’s rated current

- This parameter sets the max. current output of the drive.

06 - 12 Electronic Thermal Relay Selection (Motor 1)

Factory Setting: 2

Settings 0: Inverter motor
1: Standard motor
2: Disable

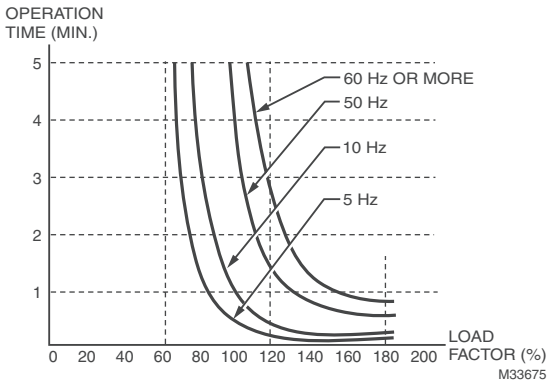
- It is used to prevent self-cooled motor overheats under low speed. User can use electronic thermal relay to limit driver’s output power.

06 - 13 Electronic Thermal Characteristic for Motor 1

Factory Setting: 60.0

Settings 30.0~600.0 seconds

- The parameter is set by the 150% of motor rated current and the setting of Pr.06-13 and Pr.06-28 to prevent the motor damaged from overheating. When it reaches the setting, it will display “EoL1/EoL2” and the motor will be in free running.



06 - 14 Heat Sink Over-heat (OH) Warning

Factory Setting: 85.0

Settings 0.0~110.0

06 - 15 Stall Prevention Limit Level

Factory Setting: 50

Settings 0~100% (Refer to Pr.06-02 and 06-03)

- When operation frequency is larger than Pr.01-01
  For example: Pr06-02=150%, Pr. 06-03=100% and Pr. 06-15=80%:
  Stall Prevention Level during acceleration **=** 06-02x06-15=150x80%=120%.
  Stall Prevention Level at constant speed**=** 06-03x06-15=100x80%=80%

- When operation frequency is larger than Pr.01-01 (Base Frequency/Motor Rated Frequency);
  For example: Pr06-02=150%, Pr. 06-03=100% and Pr. 06-15=80%
  Stall Prevention Level during acceleration **=** 06-02x06-15=150x80%=120%.
  Stall Prevention Level at constant speed**=** 06-03x06-15=100x80%=80%.

06 - 16 Present Fault Record
06 - 17 Second Most Recent Fault Record
06 - 18 Third Most Recent Fault Record
06 - 19 Fourth Most Recent Fault Record
06 - 20 Fifth Most Recent Fault Record
06 - 21 Sixth Most Recent Fault Record

Settings:

0: No fault record

1: Over-current during acceleration (ocA)

2: Over-current during deceleration (ocd)

3: Over-current during constant speed (ocn)

4: Ground fault (GFF)

5: IGBT short-circuit (occ)

6: Over-current at stop (ocS)

7: Over-voltage during acceleration (ovA)

8: Over-voltage during deceleration (ovd)

9: Over-voltage during constant speed (ovn)

10: Over-voltage at stop (ovS)

11: Low-voltage during acceleration (LvA)

12: Low-voltage during deceleration (Lvd)

13: Low-voltage during constant speed (Lvn)

14: Stop mid-low voltage (LvS)

15: Phase loss protection (OrP)

16: IGBT over-heat (oH1)

17: Capacitance over-heat (oH2) (for 40hp above)

18: tH1o (TH1 open: IGBT over-heat protection error)

19: tH2o (TH2 open: capacitance over-heat protection error)

20: Reserved

21: Drive over-load (oL)

22: Electronics thermal relay 1 (EoL1)

23: Electronics thermal relay 2 (EoL2)

24: Motor PTC overheat (oH3) (PTC)

25: Reserved

26: Over-torque 1 (ot1)

27: Over-torque 2 (ot2)

28: Low current (uC)

29: Home limit error (LMIT)

30: Memory write-in error (cF1)

31: Memory read-out error (cF2)

32: Reserved

33: U-phase current detection error (cd1)

34: V-phase current detection error (cd2)

35: W-phase current detection error (cd3)

36: Clamp current detection error (Hd0)

37: Over-current detection error (Hd1)

38: Over-voltage detection error (Hd2)

39: occ IGBT short circuit detection error (Hd3)

40: Auto tuning error (AUE)

41: PID feedback loss (AFE)

42: Reserved

43: Reserved

44: Reserved

45: Reserved

46: Reserved

47: Reserved

48: Analog current input loss (ACE)

49: External fault input (EF)

50: Emergency stop (EF1)

51: External Base Block (bb)

52: Password error (PcodE)

53: Reserved

54: Communication error (CE1)

55: Communication error (CE2)

56: Communication error (CE3)

57: Communication error (CE4)

58: Communication Time-out (CE10)

59: PU Time-out (CP10)

60: Brake transistor error (bF)

61: Y-connection/?-connection switch error (ydc)

62: Decel. Energy Backup Error (dEb)

63: Slip error (oSL)

64: Reserved

65: Reserved

66~72: Reserved

73: External safety gate S1

74: Fire Fault

75~78: Reserved

79: Uocc U phase over current (Detection begins as RUN is pressed, software protection)

80: Vocc V phase over current (Detection begins as RUN is pressed, software protection)

81: Wocc W phase over current (Detection begins as RUN is pressed, software protection)

82: OPHL U phase output phase loss

83: OPHL Vphase output phase loss

84: OPHL Wphase output phase loss

85~100: Reserved

101: CGdE CANopen software disconnect1

102: CHbE CANopen software disconnect2

103: CSYE CANopen synchronous error

104: CbFE CANopen hardware disconnect

105: CIdE CANopen index setting error

106: CAdE CANopen slave station number setting error

107: CFrE CANopen index setting exceed limit

- When the fault occurs and force stopping, it will record in this parameter.
- At stop with low voltage Lv (LvS warn, no record). During operation with mid-low voltage Lv (LvA, Lvd, Lvn error, will record).
- Setting 62: when dEb function is enabled, the drive will execute dEb and record to the Pr.06-16 to Pr.06-21 simultaneously.

06 - 22 Fault Output Option 1
06 - 23 Fault Output Option 2
06 - 24 Fault Output Option 3
06 - 25 Fault Output Option 4

Factory Setting: 0

Settings 0 to 65535 sec (refer to bit table for fault code)

- These parameters can be used with multi-function output (set to 35-38) for the specific requirement. When the fault occurs, the corresponding terminals will be activated (It needs to convert binary value to decimal value to fill in Pr.06-22 to Pr.06-25)

Fault Code	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6
	current	Volt.	OL	SYS	FBK	EXI	CE
0: No fault							
1: Over-current during acceleration (ocA)	●						
2: Over-current during deceleration (ocd)	●						
3: Over-current during constant speed (ocn)	●						
4: Ground fault (GFF)	●						
5: IGBT short-circuit (occ)	●						
6: Over-current at stop (ocS)	●						
7: Over-voltage during acceleration (ovA)		●					
8: Over-voltage during deceleration (ovd)		●					
9: Over-voltage during constant speed (ovn)		●					
10: Over-voltage at stop (ovS)		●					
11: Low-voltage during acceleration (LvA)		●					
12: Low-voltage during deceleration (Lvd)		●					
13: Low-voltage during constant speed (Lvn)		●					
14: Stop mid-low voltage (LvS)		●					
15: Phase loss protection (OrP)		●					
16: IGBT over-heat (oH1)			●				
17: Capacitance over-heat (oH2)			●				
18: tH1o (TH1 open)			●				
19: tH2o (TH2 open)			●				
20: Reserved						●	
21: Drive over-load (oL)			●				
22: Electronics thermal relay 1 (EoL1)			●				
23: Electronics thermal relay 2 (EoL2)			●				
24: Motor PTC overheat (oH3) (PTC)			●				
25: Reserved						●	
26: Over-torque 1 (ot1)			●				
27: Over-torque 2 (ot2)			●				
28: Low current (uC)	●						
29: Reserved							
30: Memory write-in error (cF1)				●			

31: Memory read-out error (cF2)				●			
32: Reserved				●			
33: U-phase current detection error (cd1)				●			
34: V-phase current detection error (cd2)				●			
35: W-phase current detection error (cd3)				●			
36: Clamp current detection error (Hd0)				●			
37: Over-current detection error (Hd1)				●			
38: Over-voltage detection error (Hd2)				●			
39: occ IGBT short circuit detection error (Hd3)				●			
40: Auto tuning error (AUE)				●			
41: PID feedback loss (AFE)					●		
42: Reserved					●		
43: Reserved					●		
44: Reserved					●		
45: Reserved					●		
46: Reserved					●		
47: Reserved					●		
48: Analog current input loss (ACE)					●		
49: External fault input (EF)						●	
50: Emergency stop (EF1)						●	
51: External Base Block (bb)						●	
52: Password error (PcodE)				●			
53: Reserved							
54: Communication error (CE1)							●
55: Communication error (CE2)							●
56: Communication error (CE3)							●
57: Communication error (CE4)							●
58: Communication Time-out (CE10)							●
59: PU Time-out (CP10)							●
60: Brake transistor error (bF)						●	
61: Y-connection/?-connection switch error (ydc)						●	
62: Decel. Energy Backup Error (dEb)		●					
63: Slip error (oSL)						●	
64: Electromagnet switch error (ryF)						●	
65: Reserved						●	
73: External safety gate S1				●			
74~78: Reserved							
79: U phase over current (Uocc)	●						
80: V phase over current (Vocc)	●						
81: W phase over current (Wocc)	●						
82: OPHL U phase output phase loss	●						
83: OPHL Vphase output phase loss	●						
84: OPHL Wphase output phase loss	●						

85~100: Reserved							
101: CGdE CANopen software disconnect1							●
102: CHbE CANopen software disconnect2							●
103: CSYE CANopen synchronous error							●
104: CbFE CANopen hardware disconnect							●
105: CIdE CANopen index setting error							●
106: CAdE CANopen slave station number setting error							●
107: CFrE CANopen index setting exceed limit							●

06 - 26 PTC (Positive Temperature Coefficient) Detection Selection

Factory Setting: 0

Settings 0: Warn and keep operating
1: Warn and ramp to stop
2: Warn and coast to stop
3: No warning

- This is the operating mode of a drive after Pr.06-26 is set to define PTC detection.

06 - 27 PTC Level

Factory Setting: 50.0

Settings 0.0~100.0%

- It needs to set AVI1/ACI/AVI2 analog input function Pr.03-00~03-02 to 6 (P.T.C. thermistor input value).
- It is used to set the PTC level, and the corresponding value for 100% is max. analog input value.

06 - 28 Frequency Command for Malfunction

Factory Setting: Read Only

Settings 0.00~655.35Hz

- When malfunction occurs, use can check the frequency command. If it happens again, it will overwrite the previous record.

06 - 29 Output Frequency at Malfunction

Factory Setting: Read Only

Settings 0.00~655.35Hz

- When malfunction occurs, use can check the current frequency command. If it happens again, it will overwrite the previous record.

06 - 30 Output Voltage at Malfunction

Factory Setting: Red Only

Settings 0.0~6553.5V

- When malfunction occurs, user can check current output voltage. If it happens again, it will overwrite the previous record.

06 - 31 DC Voltage at Malfunction

Factory Setting: Read Only

Settings 0.0~6553.5V

- When malfunction occurs, user can check the current DC voltage. If it happens again, it will overwrite the previous record.

06 - 32 Output Current at Malfunction

Factory Setting: Read Only

Settings 0.00~655.35Amp

- When malfunction occurs, user can check the current output current. If it happens again, it will overwrite the previous record.

06 - 33 IGBT Temperature at Malfunction

Factory Setting: Read Only

Settings 0.0~6553.5°C

- When malfunction occurs, user can check the current IGBT temperature. If it happens again, it will overwrite the previous record.

06 - 34 Capacitance Temperature at Malfunction

Factory Setting: Read Only

Settings 0.0~6553.5°C

- When malfunction occurs, user can check the current capacitance temperature. If it happens again, it will overwrite the previous record.

06 - 35 Motor Speed in rpm at Malfunction

Factory Setting: Read Only

Settings 0.0~6553.5 RPM

- When malfunction occurs, user can check the current motor speed in rpm. If it happens again, it will overwrite the previous record

06 - 36 Status of Multi-function Input Terminal at Malfunction

Factory Setting: Read Only

Settings 0~65535

06 – 37 Status of Multi-function Output Terminal at Malfunction

Factory Setting: Read Only

Settings 0~65535

- When malfunction occurs, user can check the status of multi-function input/output terminals. If it happens again, it will overwrite the previous record

06 - 38 Drive Status at Malfunction

Factory Setting: Read Only

Settings 0~65535

- When malfunction occurs, please check the drive status (communication address 2119H). If malfunction happens again, the previous record will be overwritten by this parameter.

06 - 39 Treatment for Output Phase Loss Detection (OPHL)

Factory Setting: 3

Settings 0: Warn and keep operating
1: Warn and ramp to stop
2: Warn and coast to stop
3: No warning

- OPHL: Output Phase Loss

06 - 40 Deceleration Time of Output Phase Loss

Factory Setting: 3.000

Settings 0.000~65.535 seconds

06 - 41 Current Bandwidth

Factory Setting: 0.00

Settings 0.00~655.35%

06 - 42 DC Brake Time of Output Phase Loss

Factory Setting: 0.000

Settings 0.000~65.535 seconds

06 - 43 Time for Input Phase Loss Detection

Factory Setting: 0.20

Settings 0.00~600.00 seconds

06 – 44 Ripple of Input Phase Loss

Factory Setting: 30.0 / 60.0

Settings 230V models: 0.0~160.0 Vdc
460V models 0.0~320.0 Vdc

06 - 45 Treatment for the detected Input Phase Loss (OrP)

Factory Setting: 1

Settings 0: warn, ramp to stop
1: warn, coast to stop

- Over ripple protect

06 - 46 Derating Protection

Factory Setting: 1

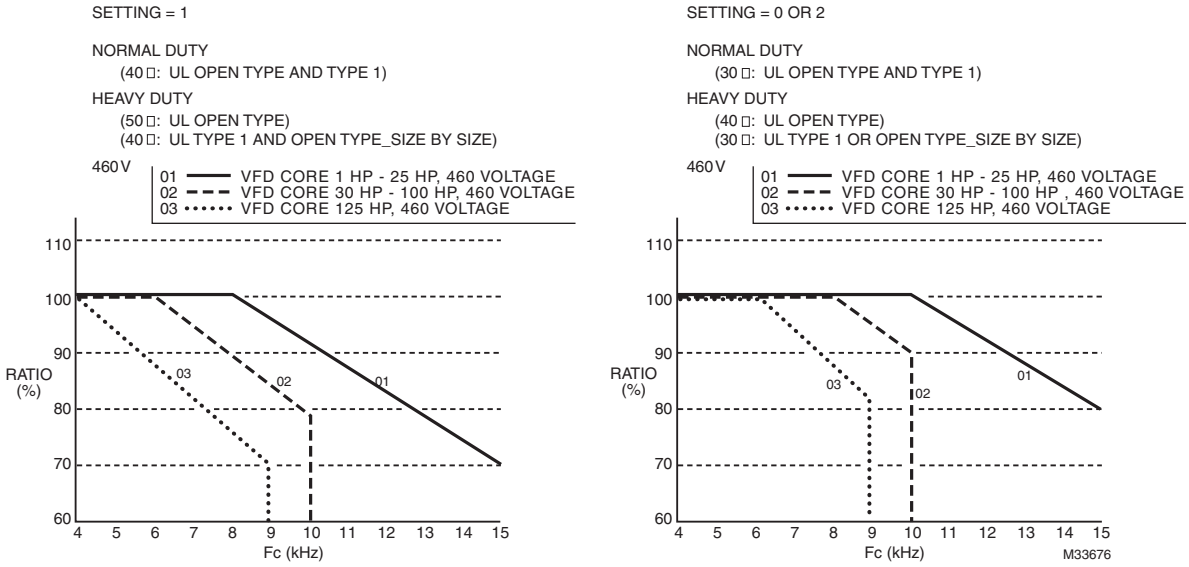
Settings 0: constant rated current and limit carrier wave by load current and temperature

1: constant carrier frequency and limit load current by setting carrier wave

2: constant rated current (same as setting 0), but close current limit

- **Setting 0**: When the rated current is constant, carrier frequency (Fc) outputted by PWM will auto decrease according to surrounding temperature, overload output current and time. If overload situation is not frequent and only cares the carrier frequency operated with the rated current for a long time and carrier wave changes during short overload, it is recommended to set to 0.
  Refer to the following diagram for the level of carrier frequency. Take VFD in heavy duty as example, surrounding temperature 50°C with independent installation and UL open-type. When the carrier frequency is set to 15kHz, it corresponds to 72% rated output current. When it outputs higher than the value, it will auto decrease the carrier frequency. If the output is 83% rated current and the carrier frequency will decrease to 12kHz. In addition, it will also decrease the carrier frequency when overload. When the carrier frequency is 15kHz and the current is 120%*72%=86% for a minute, the carrier frequency will decrease to the factory setting.
- **Setting 1**: It is used for the fixed carrier frequency and prevents the carrier wave changes and motor noise caused by the surrounding temperature and frequent overload.
  Refer to the following for the derating level of rated current. Take VFD in heavy duty as example, when the carrier frequency keeps in 15kHz and the rated current is decreased to 72%, it will have OL protection when the current is 120%*72%=86% for a minute. Therefore, it needs to operate by the curve to keep the carrier frequency.
- **Setting 2**: It sets the protection method and action to 0 and disables the current limit for the Ratio*160% of output current in the heavy duty and Ratio*180% of output current in the heavy duty. The advantage is that it can provide higher output current when the setting is higher than the factory setting of carrier frequency. The disadvantage is that it decreases carrier wave easily when overload.

Derating Curve diagram while Normal duty and Heavy duty: 460V & 230V



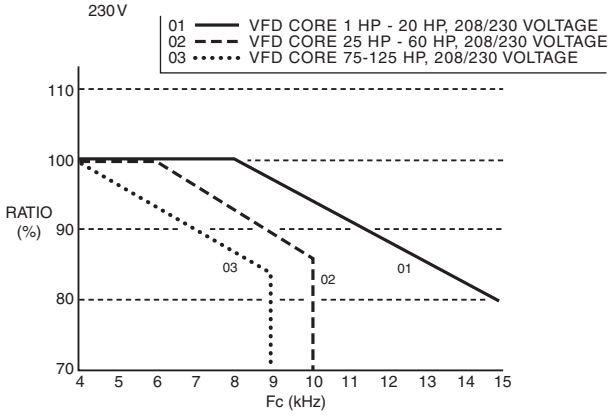
DERATING CURVE DIAGRAM WHILE NORMAL DUTY AND HEAVY DUTY (CONTINUES)

SETTING = 1

NORMAL DUTY
(40□: UL OPEN TYPE AND TYPE 1)

HEAVY DUTY
(50□: UL OPEN TYPE)
(40□: UL TYPE 1 AND OPEN TYPE_SIZE BY SIZE)

230V

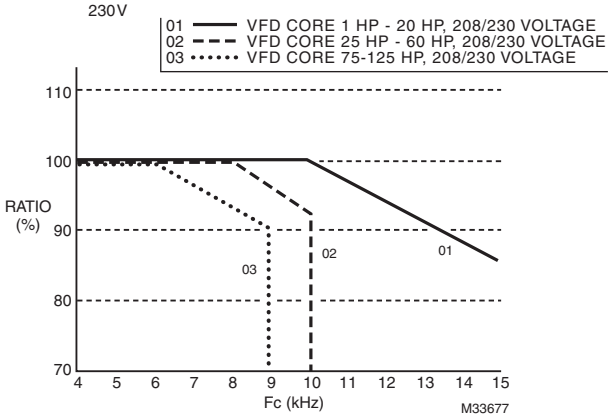


SETTING = 0 OR 2

NORMAL DUTY
(30□: UL OPEN TYPE AND TYPE 1)

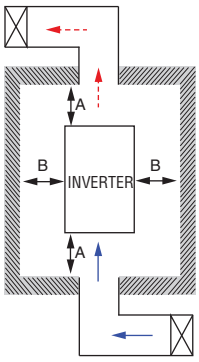
HEAVY DUTY
(40□: UL OPEN TYPE)
(30□: UL TYPE 1 OR OPEN TYPE_SIZE BY SIZE)

230V



M33677

- It should go with Pr. 00-11 and Pr.00-12 for setting.



MINIMUM MOUNTING CLEARANCE				
FRAME	A (mm/in)	B (mm/in)	C (mm/in)	D (mm/in)
A~C	60/1.2	30/0.6	10/0.2	0
D~E	100/3.3	50/1.7	-	0

NOTE:

- THE MOUNTING CLEARANCES SHOWN IN THE LEFT FIGURE ARE NOT FOR INSTALLING THE DRIVE IN A CONFINED SPACE (SUCH AS CABINET OR ELECTRIC BOX). WHEN INSTALLING IN A CONFINED SPACE, BESIDES THESE SAME MINIMUM MOUNTING CLEARANCES, IT NEEDS TO HAVE THE VENTILATION EQUIPMENT OR AIR CONDITIONER TO KEEP THE SURROUNDING TEMPERATURE LOWER THAN THE OPERATION TEMPERATURE.
- THE FOLLOWING TABLE SHOWS HEAT DISSIPATION AND THE REQUIRED AIR VOLUME WHEN INSTALLING A SINGLE DRIVE IN A CONFINED SPACE. WHEN INSTALLING MULTIPLE DRIVES, THE REQUIRED AIR VOLUME SHALL BE MULTIPLIED BY THE NUMBER OF DRIVES.
- REFER TO THE CHART (AIR FLOW RATE FOR COOLING) FOR VENTILATION EQUIPMENT DESIGN AND SELECTION.
- REFER TO THE CHART (POWER DISSIPATION) FOR AIR CONDITIONER DESIGN AND SELECTION.
- IT IS THE MINIMUM DISTANCE REQUIRED FOR FRAME A~D. IF DRIVES ARE INSTALLED CLOSER THAN THE MINIMUM MOUNTING CLEARANCE, THE FAN MAY NOT FUNCTION PROPERLY.

M31500A

Table 3. Air Flow Requirements

Air flow rate for cooling								Power Dissipation		
		Flow Rate (cfm)			Flow Rate (m^3/hr)			Power Dissipation (Watts)		
Model 230Vac	Frame Size	External	Internal	Total	External	Internal	Total	Loss External (Heat sink)	Internal	Total
HCRDA0010A1000T	A	-	-	-	-	-	-	40	31	71
HCRDA0020A1000T	A	-	-	-	-	-	-	61	39	100
HCRDA0030A1000T	A	14	-	14	24	-	24	81	45	126
HCRDA0050A1000T	A	14	-	14	24	-	24	127	57	184
HCRDA0075A1000T	A	10	-	10	17	-	17	158	93	251
HCRDA0100B1000T	B	40	14	54	68	24	92	291	101	392
HCRDA0150B1000T	B	66	14	80	112	24	136	403	162	565
HCRDA0200B1000T	B	58	14	73	99	24	124	570	157	727
HCRDA0250C1000T	C	166	12	178	282	20	302	622	218	840
HCRDA0300C1000T	C	166	12	178	282	20	302	777	197	974
HCRDA0400C1000T	C	146	12	158	248	20	268	878	222	1100
HCRDA0500D1000T	D	179	30	209	304	51	355	1271	311	1582
HCRDA0600D1000T	D	179	30	209	304	51	355	1550	355	1885
HCRDA0750E1000T	E	228	73	301	387	124	511	1762	489	2251
HCRDA1000E1000T	E	228	73	301	387	124	511	2020	574	2594
HCRDA1250E1000T	E	246	73	319	418	124	542	2242	584	3026
Model 460Vac										
HCRDC0010A1000T	A	-	-	-	-	-	-	35	32	67
HCRDC0020A1000T	A	-	-	-	-	-	-	44	31	75
HCRDC0030A1000T	A	-	-	-	-	-	-	58	43	101
HCRDC0050A1000T	A	14	-	14	24	-	24	92	60	152
HCRDC0075A1000T	A	10	-	10	17	-	17	135	99	234
HCRDC0100A1000T	A	10	-	10	17	-	17	165	164	439
HCRDC0150B1000T	B	40	14	54	68	24	92	275	93	380
HCRDC0200B1000T	B	66	14	80	112	24	136	370	194	564
HCRDC0250B1000T	B	58	14	73	99	24	124	370	194	564
HCRDC0300C1000T	C	99	21	120	168	36	204	455	358	813
HCRDC0400C1000T	C	99	21	120	168	36	204	609	363	972
HCRDC0500C1000T	C	126	21	147	214	36	250	845	405	1250
HCRDC0600D1000T	D	179	30	209	304	51	355	1056	459	1515
HCRDC0750D1000T	D	179	30	209	304	51	355	1163	669	1832
HCRDC1000D1000T	D	179	30	209	304	51	355	1639	657	2296
HCRDC1250D1000T	D	186	30	216	316	51	367	1787	955	2742

The required airflow shown in chart is for installing single drive in a confined space.

When installing the multiple drives, the required air volume should be the required air volume for single drive multiplied by the number of the drives.

Heat dissipation for each model is calculated by rated voltage, current and default carrier at full load, full speed, and maximum ambient temperature

06 – 47 PT100 Detection Level 1

Factory Setting: 5.000

Settings 0.00~10.00V

06 - 48 PT100 Detection Level 2

Factory Setting: 7.000

Settings 0.00~10.00V

06 – 49 PT100 Level 1 Frequency Protection

Factory Setting: 0.00

Settings 0.00~600.00 Hz

06 - 50 Software Detection GFF Current Level

Factory Setting: 60.0

Settings 0.0~6553.5%

06 - 51 Software Detection GFF Filter Time

Factory Setting: 0.10

Settings 0.0~655.35

06 - 52 Disable Level of dab

Factory Setting: 180.0/360.0

Settings 230V models: 0.0~220.0 Vdc
460V models 0.0~440.0 Vdc

06 - 53 Fault Record 1 (min)
06 - 54 Fault Record 2 (min)
06 - 55 Fault Record 3 (min)
06 - 56 Fault Record 4 (min)
06 - 57 Fault Record 5 (min)
06 - 58 Fault Record 6 (min)

Factory Setting: Read Only

Settings 0~65535 minutes

- Pr.06-53 to Pr.06-58 are used to record the operation time for 6 malfunctions and it can also check if there is any wrong with the drive according to the internal time.
- When the malfunction occurs during operation, it records fault in Pr.06-16~06-21 and operation time is recorded in Pr.06-53~06-58.

For example: When the first fault ovA occurs after operation 3000 min., second fault ovd occurs at 3482 min., third fault ovA occurs at 4051 min., fourth fault ocA at 5003 min., fifth fault ocA at 5824 min., sixth fault ocd occurs at 6402 min. and seven fault ocS at 6951 min.

It will be recorded as the table below.

First Fault	Pr.06-16	ovA	Pr.06-53	3000
Second Fault	Pr. 06-16	ovd	Pr. 06-53	3482
	Pr. 06-17	ovA	Pr. 06-54	3000
Third Fault	Pr. 06-16	ovA	Pr. 06-53	4051
	Pr. 06-17	ovd	Pr. 06-54	3482
	Pr. 06-18	ovA	Pr. 06-55	3000
Seventh Fault	Pr. 06-16	ocS	Pr. 06-53	6951
	Pr 06-17	ocA	Pr 06-54	5824
	Pr 06-18	ocA	Pr 06-55	5003
	Pr 06-19	ovA	Pr 06-56	4051
	Pr 06-20	ovd	Pr 06-57	3482
	Pr 06-21	ovA	Pr 06-58	3000

06 - 59 Number of Days of Malfunction (V)

Factory Setting: Read Only

Settings Read Only

06 - 60 Duration of Malfunction

Factory Setting: Read Only

Settings Read Only

06 - 61 Low Current Setting Level

Factory Setting: 0.0

Settings 0.0 ~ 100.0%

06 - 62 Low Current Detecting Time

Factory Setting: 0.00

Settings 0.00 ~ 360.00 seconds

06 - 63 Treatment for low current

Factory Setting: 0

Settings 0: No function
1: warn and coast to stop
2: warn and ramp to stop by 2nd deceleration time
3: warn and operation continue

06 - 64 Fire Mode

Factory Setting: 1

Settings 0: No Function
1: Forward Operation
2: Reverse Operation

- This parameter needs to work with multi-input function terminal #58 or #59 and multi-output function terminal #53 and #54.
  Setting is 0: Fire mode is disabled
  Setting is 1: When there is a fire, motors will operate clockwise (U,V.W).
  Setting is 2: When there is a fire, motors will operate counter-clockwise.

06 - 65 Operating Frequency when running Fire Mode (hz)

Factory Setting: 60.00

Settings 0.00 ~ 600.00 hz

- This parameter is to set up the drive's frequency when the fire mode is enabled.

06 - 66 Enable Bypass on Fire Mode

Factory Setting: 0.00

Settings 0: Disable Bypass
1: Enable Bypass

06 - 67 Bypass Delay Time on Fire Mode

Factory Setting: 0.00

Settings 0.00 ~ 6550.0 seconds

06 - 68 Auto-restart counter of Fire Mode

Factory Setting: 0.00

Settings 0 ~ 10

06 - 69 Length of Time to reset auto counter

Settings 0.00 ~ 6000.0sec Factory Setting: 60.0

- The settings of Pr06-66 to Pr06-69 decide if switch motors to operating under mains electricity.

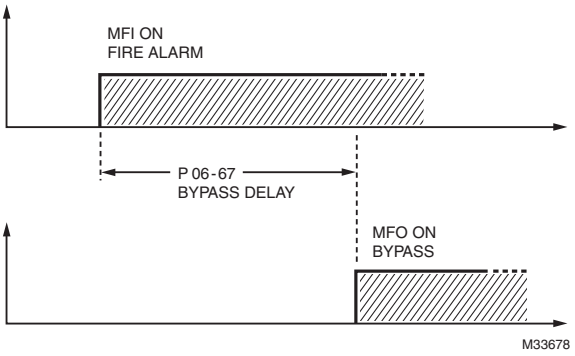


Fig. 1. Diagram of Bypass Function's Sequence

Conditions required to enable the bypass function
When Pr06-66 is set to 1 and under one of two conditions below.

1. When operating at fire mode, there is error (as shown in the table below) and the fire alarm rings according to the time setting of Pr06-67, then the bypass function will be enabled. MFO bypass indication will be ON.
2. When operating at fire mode, there is an error on auto-reset and the number of time to auto-reset remains zero or the fire alarm rings according to the time setting of Pr06-67, then the bypass function will be enabled. MFO bypass indication will be ON. If the auto rest is successful before the bypass function is enabled, then the bypass delay counter will return to zero to wait for next trigger.

Table 4. Error detection under Normal mode, Fire mode and Bypass function at Fire mode (V means detectable)

Code	Error name	Normal mode	Fire Mode	Enable bypass function
1	Over current during Acceleration (ocA)	V(RS)	V (able to auto-reset)	V
2	Over current during deceleration (ocd)	V(RS)	V (able to auto-reset)	V
3	Over current during normal speed (ocn)	V(RS)	V (able to auto-reset)	V
4	Ground Fault (GFF)	V	V (able to auto-reset)	V
5	IGBT short circuit (occ)	V(RS)	V (able to auto-reset)	V
6	Over current during Stop (ocS)	V(RS)	V (able to auto-reset)	V
7	Over voltage during Acceleration (ovA)	V(RS)	V (able to auto-reset)	V
8	Over voltage during deceleration (ovd)	V(RS)	V (able to auto-reset)	V
9	Over voltage during normal speed (ovn)	V(RS)	V (able to auto-reset)	V
10	Over voltage during Stop (ovS)	V(RS)	V (able to auto-reset)	V
11	Low voltage during Acceleration (LvA)	V	Not detectable	Not detectable
12	Low voltage during deceleration (Lvd)	V	Not detectable	Not detectable
13	Low voltage during normal speed (Lvn)	V	Not detectable	Not detectable
14	Low voltage during Stop (LvS)	V	Not detectable	Not detectable
15	Input phase loss (PHL)	V	V (able to auto-reset)	V
16	Over heat 1 (oH1)	V	V (able to auto-reset)	V
17	Over heat 2 (oH2)	V	V (able to auto-reset)	V
18	Thermister 1 open (tH1o)	V	V (able to auto-reset)	V
19	Thermister 2 open (tH2o)	V	V (able to auto-reset)	V
20	Main Power OFF	V	Not detectable	Not detectable
21	Over Load (oL) (150% 1Min, Inverter)	V	Not detectable	Not detectable

Table 4. Error detection under Normal mode, Fire mode and Bypass function at Fire mode (V means detectable)

Code	Error name	Normal mode	Fire Mode	Enable bypass function
22	Motor 1 over load (EoL1)	V	Not detectable	Not detectable
23	Motor 2 over load (EoL2)	V	Not detectable	Not detectable
24	Over heat 3 (oH3) (PTC)	V	V (able to auto-reset)	V
26	Over torque 1 (ot1)	V	Not detectable	Not detectable
27	Over torque 2 (ot2)	V	Not detectable	Not detectable
30	EEPROM write error (cF1)	V	Not detectable	Not detectable
31	EEPROM read error (cF2)	V	V	Not detectable
33	U phase current sensor detection error (cd1)	V	V	Not detectable
34	V phase current sensor detection error (cd2)	V	V	Not detectable
35	W phase current sensor detection error (cd3)	V	V	Not detectable
36	Hardware Logic error 0 (Hd0) - cc	V	V	Not detectable
37	Hardware Logic error 1 (Hd1) - oc	V	V	Not detectable
38	Hardware Logic error 2 (Hd2) - ov	V	V	Not detectable
39	Hardware Logic error 3 (Hd3) – occ	V	V	Not detectable
40	Motor auto tuning error (AuE)	V	Not detectable	Not detectable
41	ACI feedback loss (AFE)	V	Not detectable	Not detectable
48	ACI Loss	V	Not detectable	Not detectable
49	External fault (EF)	V	Not detectable	Not detectable
50	Emergency stop (EF1)	V	Not detectable	Not detectable
51	base block (bb)	V	Not detectable	Not detectable
52	PcodE (Password)	V	Not detectable	Not detectable
53	Software code lock (ccodE)	V	Not detectable	Not detectable
54	Communication error 1 (cE1)	V	Not detectable	Not detectable
55	Communication error 2 (cE2)	V	Not detectable	Not detectable
56	Communication error 3 (cE3)	V	Not detectable	Not detectable
57	Communication error 4 (cE4)	V	Not detectable	Not detectable
58	cE10 (Communication Time Out)	V	Not detectable	Not detectable
59	Communication time out (cP10)	V	Not detectable	Not detectable
60	Braking Transistor Fault (bf)	V	Not detectable	Not detectable
61	Y-Honeywell connected Error (ydc)	V	Not detectable	Not detectable
62	Decel. Energy Backup Error (dEb)	V	Not detectable	Not detectable
63	Over Slip Error (oSL)	V	Not detectable	Not detectable
64	MC Fault over Frame E	V	Not detectable	Not detectable
66	Unknown oc	V(RS)	V (able to auto-reset)	V
67	Unknown ov	V(RS)	V (able to auto-reset)	V
73	S1-Emergy STOP	V	V	Not detectable
74	Fire Mode	V	V (keeps on operating)	V (keeps on operating)
79	A PHASE SHORT	V	V (able to auto-reset)	V
80	B PHASE SHORT	V	V (able to auto-reset)	V
81	C PHASE SHORT	V	V (able to auto-reset)	V

Table 4. Error detection under Normal mode, Fire mode and Bypass function at Fire mode (V means detectable)

Code	Error name	Normal mode	Fire Mode	Enable bypass function
82	Output Phase Lose A	V	V (able to auto-reset)	V
83	Output Phase Lose B	V	V (able to auto-reset)	V
84	Output Phase Lose C	V	V (able to auto-reset)	V
99	CPU Trap	V	V	V
101	Guarding T-out	V	Not detectable	Not detectable
102	Heartbeat T-out	V	Not detectable	Not detectable
103	SYNC T-out	V	Not detectable	Not detectable
104	CAN Bus Off	V	Not detectable	Not detectable
105	CAN Idx exceed	V	Not detectable	Not detectable
106	CAN Address set	V	Not detectable	Not detectable
107	CAN FRAM fail	V	Not detectable	Not detectable

07 Special ParametersRepartir ~ The parameter can be set during operation

07 - 00 Software Brake Level

Factory Setting: 380.0/760.0

Settings 230V models: 350.0~450.0Vdc

460V models: 700.0~900.0Vdc

- This parameter sets the DC-bus voltage at which the brake chopper is activated. Users can choose the suitable brake resistor to have the best deceleration. Refer to Chapter 7 Accessories for the information of the brake resistor
- It is only valid for the models below 30kW of 460 series and 22kW of 230 series.

07 - 01 DC Brake Current Level

Factory Setting: 0

Settings 0~100%

- This parameter sets the level of DC Brake Current output to the motor during start-up and stopping. When setting DC Brake Current, the Rated Current is regarded as 100%. It is recommended to start with a low DC Brake Current Level and then increase until proper holding torque has been attained.

07 - 02 DC Brake Time at Start-up

Factory Setting: 0.0

Settings 0.00~60.0 seconds

- The motor may be in the rotation status due to external force or itself inertia. If the drive is used with the motor at this moment, it may cause motor damage or drive protection due to over current. This parameter can be used to output DC current before motor operation to stop the motor and get a stable start. This parameter determines the duration of the DC Brake current after a RUN command. When it is set to 0.0, it is invalid.

07 - 03 DC Brake Time at Stop

Factory Setting: 0.00

Settings 0.00~60.00 seconds

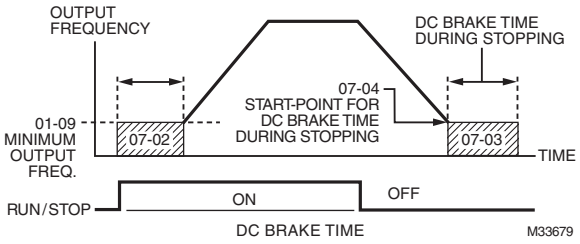
- The motor may be in the rotation status after drive stops outputting due to external force or self inertia and can't stop accurately. This parameter can output DC current to force the motor to stop after drive stops.
- This parameter determines the duration of the DC Brake current during stopping. To DC brake at stop, this function will be valid when Pr.00-16 is set to 0 or 1. When setting to 0.0, it is invalid
- Related parameters: Pr.00-16 Stop Method, Pr.07-04 Start-point for DC Brake

07 - 04 Start-Point for DC Brake

Factory Setting: 0.00

Settings 0.00~600.00Hz

- This parameter determines the frequency when DC Brake will begin during deceleration. When this setting is less than start frequency (Pr.01-09), the start-point for DC brake will start from the min. frequency.



- DC Brake at Start-up is used for loads that may move before the VFD starts, such as fans and pumps. Under such circumstances, DC Brake can be used to hold the load in position before setting it in motion.
- DC Brake at stop is used to shorten the stopping time and also to hold a stopped load in position, such as crane or cutting machine.

07 - 05 Restart after Momentary Power Down

Factory Setting: 1

Settings 0: Stop operation

1: Speed search for last frequency command

2: Speed search for the minimum output frequency

- This parameter determines the operation mode when the VFD restarts from a momentary power loss.
- The power connected to the drive may power off momentarily due to many reasons. This function allows the drive to keep outputting after power is on again after power off and won't cause drive stops.
- Setting 1: Operation continues after momentary power loss, speed search starts with the Master Frequency reference value after drive output frequency and motor rotator speed is synchronous. The motor has the characteristics of big inertia and small obstruction. For example, in the equipment with big inertia wheel, it doesn't need to wait to execute operation command until wheel is complete stop after re-start to save time.
- Setting 2: Operation continues after momentary power loss, speed search starts with the master frequency after drive output frequency and motor rotator speed is synchronous. The motor has the characteristics of small inertia and bigger obstruction.

07 - 06 Maximum Power Loss Duration

Factory Setting: 2.0

Settings 0.1~20.0 seconds

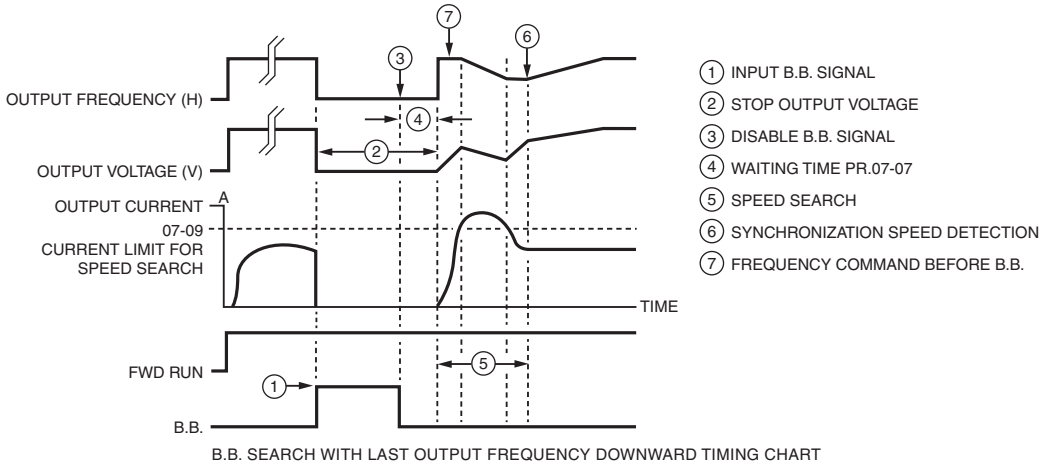
- If the duration of a power loss is less than this parameter setting, the VFD will resume operation. If it exceeds the Maximum Allowable Power Loss Time, the VFD output is then turned off (coast stop).
- The selected operation after power loss in Pr.07-05 is only executed when the maximum allowable power loss time is £5 seconds and the VFD displays "LU".
  But if the VFD is powered off due to overload, even if the maximum allowable power loss time is £5 seconds, the operation mode as set in Pr.07-05 is not executed. In that case it starts up normally

07 - 07 Base block Time

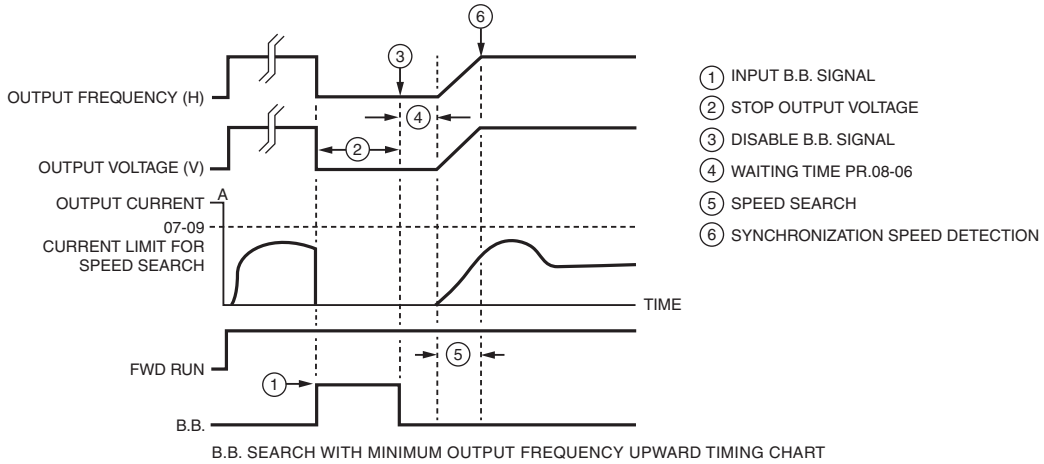
Factory Setting: 0.5

Settings 0.1~5.0 seconds

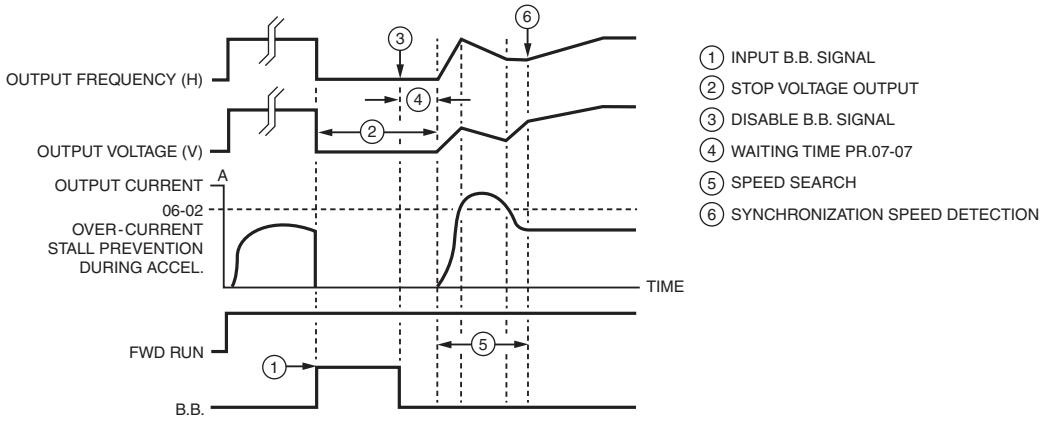
- When momentary power loss is detected, the VFD will block its output and then wait for a specified period of time (determined by Pr.07-07, called Base-Block Time) before resuming operation. This parameter should be set at a value to ensure that any residual regeneration voltage from the motor on the output has disappeared before the drive is activated again.



B.B. SEARCH WITH LAST OUTPUT FREQUENCY DOWNWARD TIMING CHART



B.B. SEARCH WITH MINIMUM OUTPUT FREQUENCY UPWARD TIMING CHART



B.B. SEARCH WITH MINIMUM OUTPUT FREQUENCY UPWARD TIMING CHART M33680

07 - 08 Current Limit for Speed Search

Factory Setting: 100

Settings 20~200%

- Following a momentary power loss, the VFD will start its speed search operation only if the output current is greater than the value set by Pr.07-08.
- When executing speed search, the V/f curve is operated by group 1 setting. The maximum current for the optimum accel./decel. and start speed search is set by Pr.07-08.
- The speed search level will affect the synchronous time. It will get the synchronization faster when this parameter is set to larger value. But too large value may active overload protection

07 - 09 Treatment to Reboots After Fault

Factory Setting: 0

Settings 0: Stop operation

1: Speed search starts with current speed

2: Speed search starts with minimum output frequency

- Fault includes: bb, oc, ov, occ, etc. To restart after oc, ov, occ, Pr.07-10 cannot be set to 0

07 - 10 # of Automatic Reboots After Fault

Factory Setting: 4

Settings 0~10

- The maximum automatic rest and reboots times for the VFD when faults (oc, ov, occ) occur is up to 10 times. When this parameter is set to 0, there will be no reset or reboots. When auto reset and reboots are enabled, the VFD perform a speed search before activate the drive.
- When the number of fault occur exceed Pr.07-10, the drive will refuse to re-start. Please press “RESET” key to continue the operation

07 - 11 Speed Search during Start-up

Factory Setting: 0

Settings 0: Disable

1: Speed search from maximum output frequency

2: Speed search from start-up motor frequency

3: Speed search from minimum output frequency

- This parameter is used for starting and stopping a motor with a high inertia. A motor with high inertia will take 2-5 minutes or longer to stop completely. By setting this parameter, the user does not need to wait for the motor to come to a complete stop before restarting the VFD. If a PG card and encoder is used on the drive and motor, then the speed search will start from the speed that is detected by the encoder and accelerate quickly to the commanded frequency. The output current is set by the Pr.07-08.

07 - 12 Decel. Time at Momentary Power Loss (dEb function)

Factory Setting: 0

Settings 0: Disable

1: 1st decel. time

2: 2nd decel. time

3: 3rd decel. time

4: 4th decel. time

5: Current decel. time

6: Auto decel. time

- This parameter is used for the decel. time selection for momentary power loss.

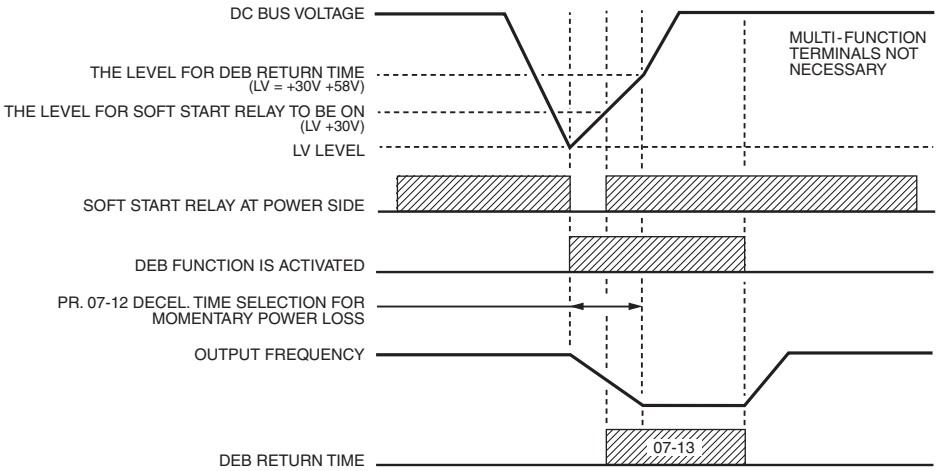
07 - 13 dEb Return Time

Factory Setting: 0.0

Settings 0.0~25.0 seconds

- This function allows the VFD decelerates to stop after momentary power loss. When the momentary power loss occurs, this function can be used for the motor to decelerate to 0 speed with deceleration stop method. When the power is on again, motor will run again after dEb return time. (has applied on high-speed spindle)

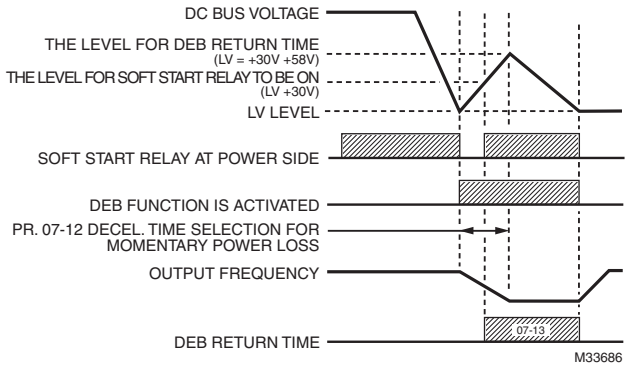
Situation 1: Insufficient power supply due to momentary power-loss/unstable power (due to low voltage)/sudden heavy-load



NOTE: WHEN PR.07-13 IS SET TO 0, THE AC MOTOR DRIVE WILL BE STOPPED AND WON'T RE-START AT THE POWER-ON AGAIN.

M33681

Situation 2: Unexpected power off, such as momentary power loss.



M33686

NOTE: For example, in textile machinery, you will hope that all the machines can be decelerated to stop to prevent broken stitching when power loss. In this case, the host controller will send a message to the VFD to use dEb function with deceleration time via EF.

07 - 14 Dwell Time at Accel.

Factory Setting: 0.00

Settings 0.00~600.00 seconds

07 - 15 Dwell Frequency at Accel

Factory Setting: 0.00

Settings 0.00~600.00 seconds

07 - 16 Dwell Frequency at Accel.

Factory Setting: 0.00

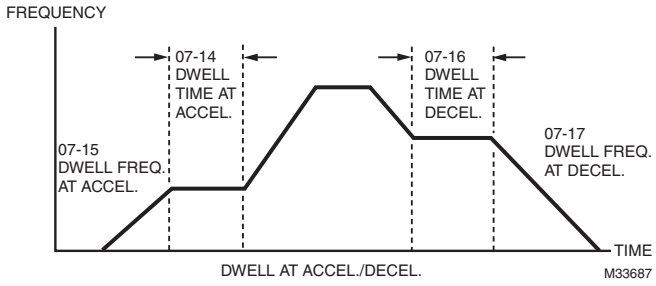
Settings 0.00~600.00Hz

07 - 17 Dwell Frequency at Decel.

Factory Setting: 0.00

Settings 0.00~600.00 Hz

- Pr.07-14 to Pr.07-17 is for heavy load to prevent OV or OC occurs.



07 - 18 Fan Cooling Control

Factory Setting: 3

Settings 0: Fan always ON

1: 1 minute after the VFD stops, fan will be OFF

2: When the VFD runs, the fan is ON. When the VFD stops, the fan is OFF

3: Fan turns ON when preliminary heat sink temperature (around 60°C) is attained.

4: Fan always OFF

- This parameter is used for the fan control.
- Setting 0: Fan will be ON as the drive's power is turned ON.
- Setting 1: 1 minute after VFD stops, fan will be OFF
- Setting 2: VFD runs and fan will be ON. VFD stops and fan will be OFF.
- Setting 3: Fan run according to IGBT and capacitance temperature. Fan will be ON when preliminary capacitance temperature is higher than 60°C. Fan will be OFF, when capacitance temperature is lower than 40°C.
- Setting 4: Fan is always OFF

07 - 19 Emergency Stop (EF) & Force Stop

Factory Setting: 0

Settings 0: Coast to stop

1: Stop by 1st deceleration time

2: Stop by 2nd deceleration time

3: Stop by 3rd deceleration time

4: Stop by 4th deceleration time

5: System Deceleration

6: Automatic Deceleration

- Pr.07-19 determines VFD stop method. When the multi-function input terminal is set to 10 or 18 and is activated, the drive will stop according to the setting in Pr.07-19.

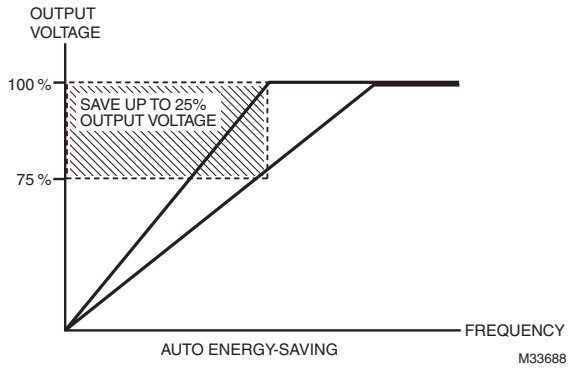
07 - 20 Auto Energy-sAVI1ng Operation

Factory Setting: 1

Settings 0: Disable

1: Enable

- When Pr.07-20 is set to 1, the acceleration and deceleration will operate with full voltage. During constant speed operation, it will auto calculate the best voltage value by the load power for the load. This function is not suitable for the ever-changing load or near full-load during operation.
- When the output frequency is constant, i.e. constant operation, the output voltage will auto decrease by the load reduction. Therefore, the drive will operate with min. power, multiplication of voltage and current.



07 - 21 Energy-saving Gain

Factory Setting: 100

Settings 10~1000%

- When Pr.00-13 is set to 1, this parameter can be used to adjust the gain of energy-saving. The factory setting is 100%. If the result is not good, it can adjust by decreasing the setting. If the motor oscillates, it should increase the setting.

07 - 22 Auto Voltage Regulation (AVR) Function

Factory Setting: 2

Settings 0: Enable AVR

1: Disable AVR

2: Disable AVR during deceleration

- The rated voltage of the motor is usually 220V/200VAC 60Hz/50Hz and the input voltage of the VFD may vary between 180V to 264 VAC 50Hz/60Hz. Therefore, when the VFD is used without AVR function, the output voltage will be the same as the input voltage. When the motor runs at voltages exceeding the rated voltage with 12% - 20%, its lifetime will be shorter and it can be damaged due to higher temperature, failing insulation and unstable torque output.
- AVR function automatically regulates the VFD output voltage to the motor rated voltage. For instance, if V/f curve is set at 200 VAC/50Hz and the input voltage is at 200V to 264VAC, then the motor Output Voltage will automatically be reduced to a maximum of 200VAC/50Hz. If the input voltage is at 180V to 200VAC, output voltage to motor and input power will be in direct proportion.
- Setting 0: when AVR function is enabled, the drive will calculate the output voltage by actual DC-bus voltage. The output voltage won't be changed by DC bus voltage.
- Setting 1: when AVR function is disabled, the drive will calculate the output voltage by DC-bus voltage. The output voltage will be changed by DC bus voltage. It may cause insufficient/over current.
- Setting 2: the drive will disable the AVR during deceleration, such as operated from high speed to low speed.
- When the motor ramps to stop, the deceleration time is longer. When setting this parameter to 2 with auto acceleration/ deceleration, the deceleration will be quicker.

07 - 23 PWM Fan Speed

Factory Setting: 60

Settings 0~100%

08 High-function PID Parameters ~ The parameter can be set during operation.

08 - 00 Input Terminal for PID Feedback

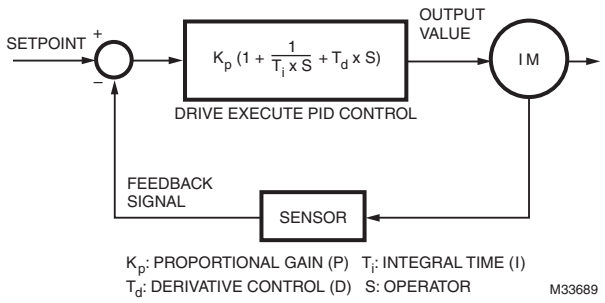
Factory Setting: 0

Settings 0: No function

1: Negative PID feedback: input from external terminal AVI1 (Pr.03-00)

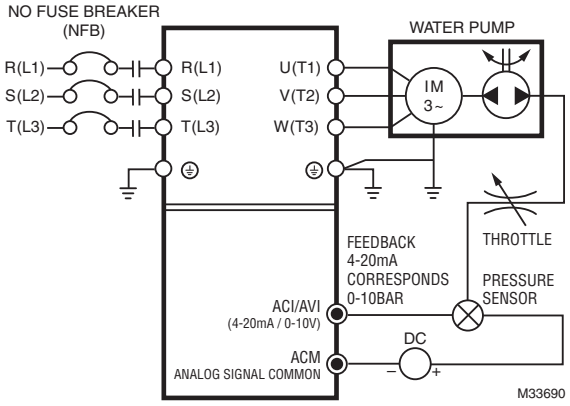
4: Positive PID feedback from external terminal AVI1 (Pr.03-00)

- Negative feedback means: +target value – feedback. It is used for the detection value will be increased by increasing the output frequency.
- Positive feedback means: -target value + feedback. It is used for the detection value will be decreased by increasing the output frequency.
- Common applications for PID control
  1. Flow control: A flow sensor is used to feedback the flow data and performs accurate flow control.
  2. Pressure control: A pressure sensor is used to feedback the pressure data and performs precise pressure control.
  3. Air volume control: An air volume sensor is used to feedback the air volume data to have excellent air volume regulation.
  4. Temperature control: A thermocouple or thermistor is used to feedback temperature data for comfortable temperature control.
  5. Speed control: A speed sensor or encoder is used to feedback motor shaft speed or input another machines speed as a target value for closed loop speed control of master-slave operation.
  Pr.10.00 sets the PID set point source (target value). PID control operates with the feedback signal as set by Pr.10.01 either 0~+10V voltage or 4-20mA current.
- PID control loop:



- Concept of PID control
  1. Proportional gain (P): the output is proportional to input. With only proportional gain control, there will always be a steady-state error.
  2. Integral time (I): the controller output is proportional to the integral of the controller input. To eliminate the steady-state error, an “integral part” needs to be added to the controller. The integral time decides the relation between integral part and error. The integral part will be increased by time even if the error is small. It gradually increases the controller output to eliminate the error until it is 0. In this way a system can be stable without steady-state error by proportional gain control and integral time control.
  3. Differential control (D): the controller output is proportional to the differential of the controller input. During elimination of the error, oscillation or instability may occur. The differential control can be used to suppress these effects by acting before the error. That is, when the error is near 0, the differential control should be 0. Proportional gain (P) + differential control (D) can be used to improve the system state during PID adjustment.

- When PID control is used in a constant pressure pump feedback application:
  Set the application's constant pressure value (bar) to be the set point of PID control. The pressure sensor will send the actual value as PID feedback value. After comparing the PID set point and PID feedback, there will be an error. Thus, the PID controller needs to calculate the output by using proportional gain (P), integral time (I) and differential time (D) to control the pump. It controls the drive to have different pump speed and achieves constant pressure control by using a 4-20mA signal corresponding to 0-10 bar as feedback to the drive.



1. Pr.00-04 is set to 10 (Display PID analog feedback signal value (b) (%))
2. 2. Pr.01-12 Acceleration Time will be set as required
3. 3. Pr.01-13 Deceleration Time will be set as required
4. 4. Pr.00-15=0 to operate from the digital keypad
5. 5. Pr.00-14=0, the set point is controlled by the digital keypad
6. 6. Pr.08-00=1 (Negative PID feedback from analog input)
7. 7. ACI analog input Pr. 03-01 set to 5, PID feedback signal.
8. 8. Pr.08-01-08-03 will be set as required
   8.1 If there is no vibration in the system, increase Pr.08-01(Proportional Gain (P))
9. 8.2 If there is no vibration in the system, reduce Pr.08-02(Integral Time (I)

- Refer to Pr.08-00 to 08-20 for PID parameters settings.

08 - 01 Proportional Gain (P)

Factory Setting: 1.0

Settings 0.0~500

- It is used to eliminate the system error. It is usually used to decrease the error and get the faster response speed. But if setting too large value in Pr.08-01, it may cause the system oscillation and instability.
- If the other two gains (I and D) are set to zero, proportional control is the only one effective.

08 - 02 Integral Time (I)

Factory Setting: 1.00

Settings 0.00~100.00 seconds

0.00: Disable

- The integral controller is used to eliminate the error during stable system. The integral control doesn't stop working until error is 0. The integral is acted by the integral time. The smaller integral time is set, the stronger integral action will be. It is helpful to reduce overshoot and oscillation to make a stable system. At this moment, the decreasing error will be slow. The integral control is often used with other two controls to become PI controller or PID controller.
- This parameter is used to set the integral time of I controller. When the integral time is long, it will have small gain of I controller, the slower response and bad external control. When the integral time is short, it will have large gain of I controller, the faster response and rapid external control.
- When the integral time is too small, it may cause system oscillation.

- If the integral time is set as 0.00, Pr.08-02 will be disabled.

08 - 03 Derivative Control (D)

Factory Setting: 0.00

Settings 0.00~1.00 seconds

- The differential controller is used to show the change of system error and it is helpful to preview the change of error. So the differential controller can be used to eliminate the error to improve system state. With the suitable differential time, it can reduce overshoot and shorten adjustment time. However, the differential operation will increase the noise interference. Please note that too large differential will cause big noise interference. Besides, the differential shows the change and the output of the differential will be 0 when there is no change. Therefore, the differential control can't be used independently. It needs to be used with other two controllers to make a PD controller or PID controller.
- This parameter can be used to set the gain of D controller to decide the response of error change. The suitable differential time can reduce the overshoot of P and I controller to decrease the oscillation and have a stable system. But too long differential time may cause system oscillation
- The differential controller acts for the change of error and can't reduce the interference. It is not recommended to use this function in the serious interference.

08 - 04 Upper limit of Integral Control

Factory Setting: 100.0

Settings 0.0~100.0%

- This parameter defines an upper bound or limit for the integral gain (I) and therefore limits the Master Frequency. The formula is: Integral upper bound = Maximum Output Frequency (Pr.01-00) x (Pr.08-04%).
- Too large integral value will make the slow response due to sudden load change. In this way, it may cause motor stall or machine damage

08 - 05 PID Output Frequency Limit

Factory Setting: 100.0

Settings 0.0~110.0%

- This parameter defines the percentage of output frequency limit during the PID control. The formula is Output Frequency Limit = Maximum Output Frequency (Pr.01-00) X Pr.08-05%.

08 - 06 PID Delay Time

Factory Setting: 0.0

Settings 0.0~35.0 seconds

08 - 07 Feedback Signal Detection Time

Factory Setting: 0.0

Settings 0.0~3600.0 seconds

- This parameter is only valid when the feedback signal is ACI.
- This parameter defines the time during which the PID feedback must be abnormal before a warning is given. It also can be modified according to the system feedback signal time.
- If this parameter is set to 0.0, the system would not detect any abnormality signal.

08 - 08 Feedback Fault Treatment

Factory Setting: 0

Settings 0: Warn and keep operation
1: Warn and ramp to stop
2: Warn and coast to stop
3: Warn and operate at last frequency

- This parameter is only valid when the feedback signal is ACI.
- VFD acts when the feedback signals (analog PID feedback) are abnormal.

08 - 09 Sleep Frequency

Factory Setting: 0.00

Settings 0.00~600.00Hz

08 - 10 Wake-up Frequency

Factory Setting: 0.00

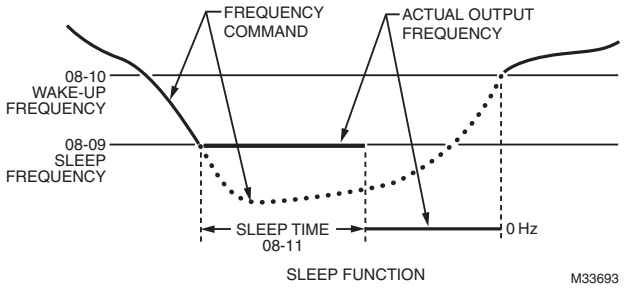
Settings 0.00~600.00Hz

08 - 11 Sleep Time

Factory Setting: 0.0

Settings 0.00~600.00 seconds

- If the command frequency falls below the sleep frequency, for the specified time in Pr. 08-12, then the drive will shut off the output and wait until the command frequency rises above Pr.08-10.



08 – 12 PID Deviation Level

Factory Setting: 10.0

Settings 1.0~50.0%

08 - 13 PID Deviation Time

Factory Setting: 5.0

Settings 0.1~300.0?

08 – 14 Filter Time for PID Feedback

Factory Setting: 5.0

Settings 0.1~300.0 seconds

- When the PID control function is normal, it should calculate within a period of time and close to the setpoint value.
- Refer to the PID control diagram for details. When executing PID feedback control, if |PID reference target value – detection value| > Pr.08-12 PID Deviation Level and exceeds Pr.08-13 setting, the PID control fault occurs. The treatment will be done as Pr.08-08 setting.

08 - 15 PID Compensation Selection

Factory Setting: 0

Settings 0: Parameter setting

1: Analog input

08 - 16 PID Compensation

Factory Setting: 0

Settings -100.0~+100.0%

08 - 17 Setting of Sleep mode function

Factory Setting: 0

Settings 0: Follow PID output command; 1: Follow PID feedback signal

When Pr08-17=0, Pr08-09, Pr08-09, Pr08-10, unit is Hz, setting range is 0~600.00Hz.
When Pr08-17=1, Pr.08-09, Pr08-10, unit is %, setting range is 0~200.00%

08 - 18 Integral Limit during Wake-up

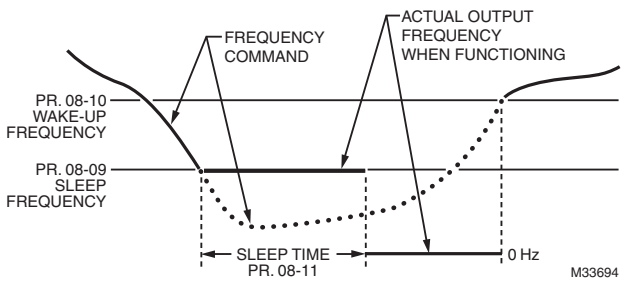
Factory Setting: 50.0%

Settings 0~200.0%

The upper limit when the VFD is at sleep mode to avoid running at high speed right after being waken up.

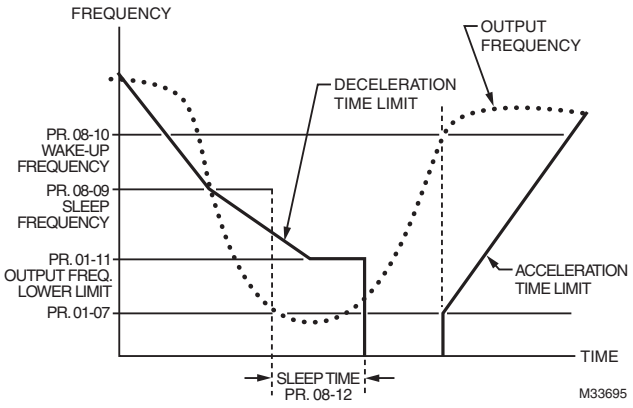
There are three types of Sleep mode and Wake-up mode.

01: Frequency command (Not using PID, Pr08-00=0)
Output Frequency ? Sleep Frequency, the drive goes to Sleep mode, 0Hz.



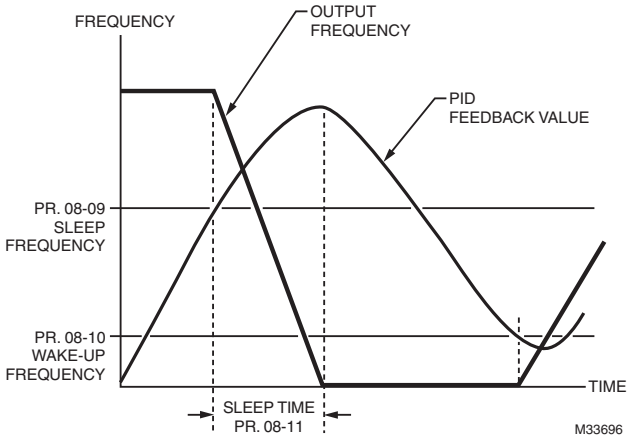
02: Internal PID Frequency Calculation Command (Not using PID, Pr08 ¹ 0)
When arriving at the sleep frequency, the system starts to calculating sleep time and the output frequency starts to decrease. If it passes the preset sleep time, the system will go to sleep at 0Hz.

If the system is not yet reaching the preset sleep time, (if there is a preset) or will stay at Pr01-07, waiting to reach the sleep time then go to sleep at 0Hz.



03: Percentage of PID's Target Value (Set PID, Pr08-00 ¹ 0)
When reaching the percentage of PID's Target Value and the percentage of the feedback value, the system

Starts to calculate the sleep time. The output frequency decreases immediately. If the system passes the preset sleep time, it will go to sleep at 0Hz. However, if it doesn't reach the preset sleep time, it will remain at Pr01-11 (if there is a preset value) or Pr01-07 waiting to reach the sleep time then go to sleep at 0Hz.



Enable or disable the Sleep and Wake-up functions depends on the setting of Pr08-09. When Pr08-09 = 0, it means Disable; when Pr08-09 ¹ 0, it means Enable.

08 - 19 PID Mode Selection

Factory Setting: 0

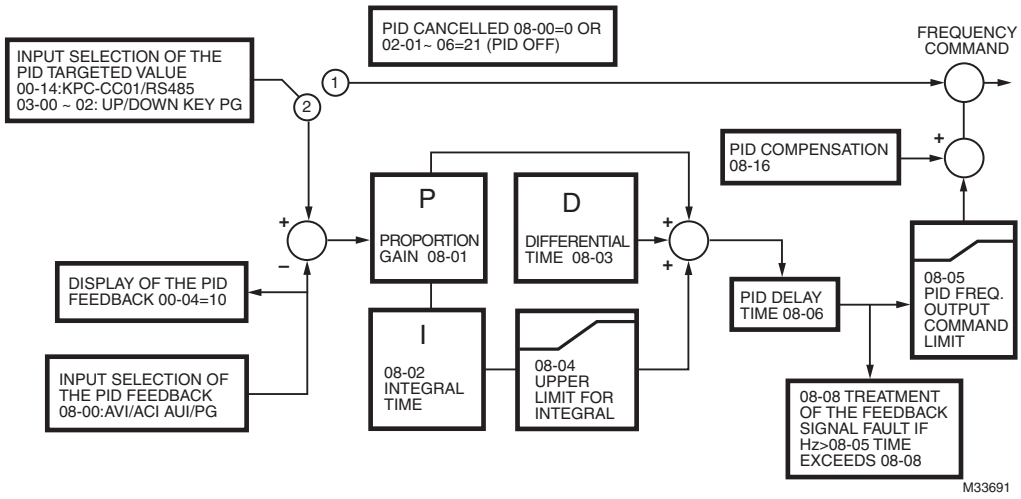
Settings 0: Serial connection

1: Parallel connection

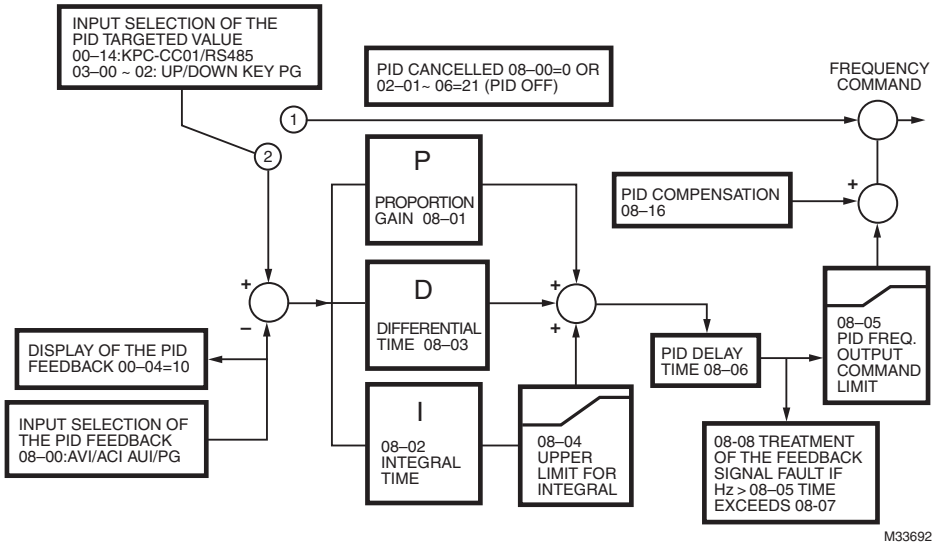
- PI Control: controlled by the P action only, and thus, the deviation cannot be eliminated entirely. To eliminate residual deviations, the P + I control will generally be utilized. And when the PI control is utilized, it could eliminate the deviation incurred by the targeted value changes and the constant external interferences. However, if the I action is excessively powerful, it will delay the responding toward the swift variation. The P action could be used solely on the loading system that possesses the integral components.

- PD Control: when deviation occurred, the system will immediately generate some operation load that is greater than the load generated single-handedly by the D action to restrain the increment of the deviation. If the deviation is small, the effectiveness of the P action will be decreasing as well. The control objects include occasions with integral component loads, which are controlled by the P action only, and sometimes, if the integral component is functioning, the whole system will be vibrating. On such occasions, in order to make the P action's vibration subsiding and the system stabilizing, the PD control could be utilized. In other words, this control is good for use with loadings of no brake functions over the processes.
- PID Control: Utilize the I action to eliminate the deviation and the D action to restrain the vibration, thereafter, combine with the P action to construct the PID control. Use of the PID method could obtain a control process with no deviations, high accuracies and a stable system.

Serial Connection



Parallel connection



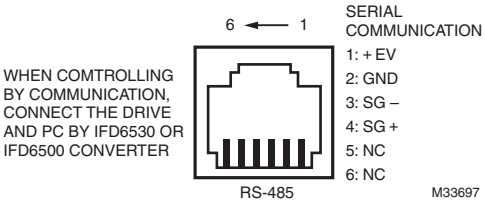
08 - 20 Enable PID to Change the Operation Direction

Factory Setting: 0

Settings 0: Disable change of direction

1: Enable change of direction

09 Communication Parameters ~ The parameter can be set during the operation.



09 - 00 COM1 Communication Address

Factory Setting: 1

Settings 1~254

- If the VFD is controlled by RS-485 serial communication, the communication address for this drive must be set via this parameter. And the communication address for each VFD must be different and unique

09 - 01 COM1 Transmission Speed

Factory Setting: 9.6

Settings 4.8~115.2kbits/s

- This parameter is used to set the transmission speed between the RS485 master (PLC, PC, etc.) and VFD.

09 - 02 COM1 Transmission Fault Treatment

Factory Setting: 3

Settings 0: Warn and keep operation

1: Warn and ramp to stop

2: Warn and coast to stop

3: No warning and continue operation

- This parameter is set to how to react if transmission errors occur

09 - 03 COM1 Time-out Detection

Factory Setting: 0.0

Settings 0.0~100.0 seconds

0.0: Disable

- It is used to set the transmission time between communication and keypad.

09 - 04 COM1 Communication Protocol

Factory Setting: 1

Settings 1: 7, N, 2 for ASCII

2: 7,E, 1 for ASCII

3: 7, O, 1 for ASCII

4: 7, E, 2 for ASCII

5: 7, O, 2 for ASCII

6: 8, N, 1 for ASCII

7: 8, N, 2 for ASCII

8: 8, E, 1 for ASCII

9: 8, O, 1 for ASCII

10: 8, E, 2 for ASCII

11: 8, O, 2 for ASCII

12: 8, N, 1 for RTU

13: 8, N, 2 for RTU

14: 8, E, 1 for RTU

15: 8, O, 1 for RTU

16: 8, E, 2 for RTU

17: 8, O, 2 for RTU

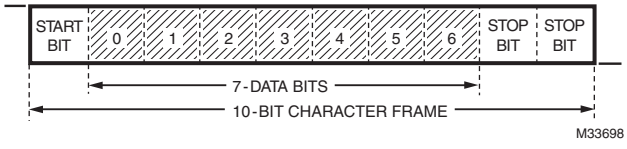
- Computer Link Control by PC or PLC (Computer Link)
- A VFD CORE can be set up to communicate on Modbus networks using one of the following modes: ASCII (American Standard Code for Information Interchange) or RTU (Remote Terminal Unit).Users can select the desired mode along with the RS-485 serial port communication protocol in Pr.09-00.
- MODBUS ASCII American Standard Code for Information Interchange: Each byte data is the combination of two ASCII characters. For example, a 1-byte data: 64 Hex, shown as ‘64’ in ASCII, consists of ‘6’ (36Hex) and ‘4’ (34Hex).

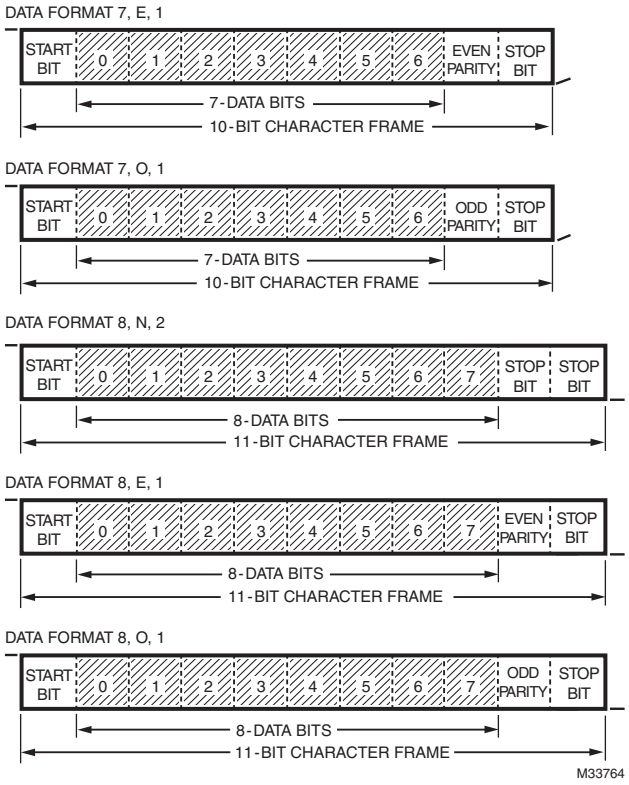
1. Code Description
Communication protocol is in hexadecimal, ASCII: "0", "9", "A", "F", every 16 hexadecimal represents ASCII code. For example:

Character	‘0’	‘1’	‘2’	‘3’	‘4’	‘5’	‘6’	‘7’
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H

Character	‘8’	‘9’	‘A’	‘B’	‘C’	‘D’	‘E’	‘F’
ASCII code	38H	39H	41H	42H	43H	44H	45H	46H

Data Format
10-bit character frame for ASCII
Data Format 7, N, 2





2. Communication Protocol

Communication Data Frame

ASCII mode?

STX	Start character = ':' (3AH)
Address Hi	Communication Address 8-bit address consists of 2 ASCII codes
Address Lo	
Function Hi	Command code: 8-bit command consists of 2 ASCII codes
Function Lo	
DATA (n-1)	Contents of data: Nx8-bit data consist of 2n ASCII codes n≤ 16, maximum of 32 ASCII codes
…….	
DATA 0	
LRC CHK Hi	LRC check sum: 8-bit check sum consists of 2 ASCII codes
LRC CHK Lo	
END Hi	End characters: END1= CR (0DH), END0= LF(0AH)
END Lo	

RTU mode?

START	A silent interval of more than 10 ms
Address	Communication address: 8-bit address
Function	Command code: 8-bit command
DATA (n-1)	Contents of data: n×8-bit data, n≤16
…….	
DATA 0	
CRC CHK Low	CRC check sum: 16-bit check sum consists of 2 8-bit characters
CRC CHK High	
END	A silent interval of more than 10 ms

Address (Communication Address)

Valid communication addresses are in the range of 0 to 254. A communication address equal to 0, means broadcast to all VFD (AMD). In this case, the AMD will not reply any message to the master device.

00H: broadcast to all VFD
01H: VFD of address 01
0FH: VFD of address 15
10H: VFD of address 16
FEH: VFD of address 254

Function (Function code) and DATA (data characters)

The format of data characters depends on the function code.
03H: read data from register
06H: write single register

Example: reading continuous 2 data from register address 2102H, AMD address is 01H.

ASCII mode:

Command Message:

STX	'?'
Address	'0'
	'1'
Function	'0'
	'3'
Starting address	'2'
	'1'
	'0'
	'2'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC Check	'D'
	'7'
END	CR
	LF

Response Message

STX	'?'
Address	'0'
	'1'
Function	'0'
	'3'
Number of data (count by byte)	'0'
	'4'
Content of starting address 2102H	'1'
	'7'
	'7'
	'0'
Content of address 2103H	'0'
	'0'
	'0'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

RTU mode

Command Message:

Address	01H
Function	03H
Starting data address	21H
	02H
Number of data (count by world)	00H
	02H
CRC CHK Low	6FH
CRC CHK High	F7H

Response Message

Address	01H
Function	03H
Number of data (count by byte)	04H
Content of data address 2102H	17H
	70H
Content of data address 2103H	00H
	00H
CRC CHK Low	FEH
CRC CHK High	5CH

06H: single write, write single data to register.

Example: writing data 6000(1770H) to register 0100H. AMD address is 01H

ASCII mode

Command Message:	
STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

Response Message	
STX	':'
Address	'0'
	'1'
Function	'0'
	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'
	'0'
LRC Check	'7'
	'1'
END	CR
	LF

RTU mode

Command Message:	
Address	01H
Function	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

Response Message	
Address	01H
Function	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

10H: write multiple registers (write multiple data to registers)

Example: Set the multi-step speed,

Pr.04-00=50.00 (1388H), Pr.04-01=40.00 (0FA0H). VFD address is 01H.

ASCII Mode

Command Message:	
STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'1'
CMD 0	'0'
Starting data address	'0'
	'5'
	'0'
	'0'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
Number of data (count by byte)	'0'
	'4'
The first data content	'1'
	'3'
	'8'
	'8'

Response Message	
STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'1'
CMD 0	'0'
Starting data address	'0'
	'5'
	'0'
	'0'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC Check	'E'
	'8'
END	CR
	LF

The second data content	‘0’
	‘F’
	‘A’
	‘0’
LRC Check	‘9’
	‘A’
END	CR
	LF

RTU Mode

Command Message:

ADR	01H
CMD	10H
Starting data address	05H
	00H
Number of data (count by word)	00H
	02H
Number of data (count by byte)	04
The first data content	13H
	88H
The second data content	0FH
	A0H
CRC Check Low	‘9’
CRC Check High	‘A’

Response Message

ADR	01H
CMD 1	10H
Starting data address	05H
	00H
Number of data (count by word)	00H
	02H
CRC Check Low	41H
CRC Check High	04H

Check sum
ASCII mode:

LRC (Longitudinal Redundancy Check) is calculated by summing up, module 256, and the values of the bytes from ADR1 to last data character then calculating the hexadecimal representation of the 2’s-complement negation of the sum.

For example,
01H+03H+21H+02H+00H+02H=29H, the 2’s-complement negation +1 of 29H is **D7**H.

RTU mode:

CRC (Cyclical Redundancy Check) is calculated by the following steps:

1. Load a 16-bit register (called CRC register) with FFFFH.
2. Exclusive OR the first 8-bit byte of the command message with the low order byte of the 16-bit CRC register, putting the result in the CRC register.
3. Examine the LSB of CRC register.
4. If the LSB of CRC register is 0, shift the CRC register one bit to the right with MSB zero filling, then repeat step 3. If the LSB of CRC register is 1, shift the CRC register one bit to the right with MSB zero filling, Exclusive OR the CRC register with the polynomial value A001H, then repeat step 3.
5. Repeat step 3 and 4 until eight shifts have been performed. When this is done, a complete 8-bit byte will have been processed.
6. Repeat step 2 to 5 for the next 8-bit byte of the command message. Continue doing this until all bytes have been processed. The final contents of the CRC register are the CRC value. When transmitting the CRC value in the message, the upper and lower bytes of the CRC value must be swapped, i.e. the lower order byte will be transmitted first.

The following is an example of CRC generation using C language. The function takes two arguments:

Unsigned char* data ß a pointer to the message buffer
Unsigned char length ß the quantity of bytes in the message buffer
The function returns the CRC value as a type of unsigned integer.

```
Unsigned int crc_chk (unsigned char* data, unsigned char length)

        {
```

```
    int j;
    unsigned int reg_crc=0Xffff;
    while(length--){
        reg_crc ^= *data++;
        for(j=0;j<8;j++){
        if(reg_crc & 0x01){  /* LSB(b0)=1 */
            reg_crc=(reg_crc>>1) ^ 0Xa001;
        }else{
            reg_crc=reg_crc >>1;
        }
    }
}
return reg_crc;        // return register CRC
```

3. Address list

Content	Address	Function	
VFD Parameters	GGnnH	GG means parameter group, nn means parameter number, for example, the address of Pr 4-01 is 0401H.	
Command Write only	2000H	Bit0~3	0: No function
			1: Stop
			2: Run
			3: Jog + Run
		Bit4~5	00B: No function
			01B: FWD
			10B: REV
			11B: Change direction
		Bit6~7	00B: 1st accel/decel
			01B: 2nd accel/decel
			10B: 3rd accel/decel
			11B: 4th accel/decel
		Bit08~11	0000B: master speed
			0001B: 1st accel/decel.
			0010B: 2nd accel/decel
			0011B: 3rd accel/decel
			0100B: 4th accel/decel
			0101B: 5th accel/decel
			0110B: 6th accel/decel
			0111B: 7th accel/decel
			1000B: 8th accel/decel
			1001B: 9th accel/decel
			1010B: 10th accel/decel
			1011B: 11th accel/decel
			1100B: 12th accel/decel
			1101B: 13th accel/decel
			1110B: 14th accel/decel
			1111B: 15th accel/decel
		Bit12	1: enable bit06-10 function
		Bit13~14	00B: No function
			01B: operated by digital keypad
			10B: operated by Pr.00-15 setting
			11B: change operation source
		Bit15	Reserved
	2001H	Frequency command	
	2002H	Bit 0	Bit 0
		Bit 1	Bit 1
		Bit 2	Bit 2
		Bit 3-15	Bit 3-15
Status monitor Read only	2100H	Error code: refer to Pr.06-16 to Pr.06-21	
	2119H	Bit0	1: FWD command
		Bit1	1: Operation status
		Bit2	1: Jog command
		Bit3	1: REV command
		Bit4	1: REV command
		Bit8	1: Master frequency Controlled by communication interface
		Bit9	1: Master frequency controlled by analog signal
		Bit10	1: Operation command controlled by communication interface
		Bit11	1: Parameters have been locked
		Bit12	1: enable to copy parameter from keypad
		Bit13~15	Reserved
	2102H	Frequency command (F)	
	2103H	Output frequency (H)	
	2104H	Output current (AXXX.X)	
	2105H	DC-BUS Voltage (UXXX.X)	
	2106H	Output voltage (EXXX.X)	

	2107H	Current step number of Multi-Step Speed Operation
	2109H	Counter value
	2116H	Multi-function display (Pr.00-04)
	211BH	Max. setting frequency
	2200H	Display output current (A)
	2201H	Display counter value of TRG terminal (c)
	2202H	Display actual output frequency (H)
	2203H	Display DC-BUS voltage (u)
	2204H	Display output voltage of U, V, W (E)
	2205H	Display output power angle of U, V, W (n)
	2206H	Display actual motor speed kW of U, V, W (P)
	2207H	Display motor speed in rpm estimated by the drive or encoder feedback (r00: positive speed, -00: negative speed)
	2208H	Display positive/negative output torque N-m estimated by the drive (t0.0: positive torque, -0.0: negative torque)
	2209H	Display PG feedback (as NOTE 1)
	220AH	Display PID feedback value after enabling PID function in % (b)
	220BH	Display signal of AVI1 analog input terminal, 0-10V corresponds to 0-100% (1.) (as NOTE 2)
	220CH	Display signal of ACI analog input terminal, 4-V20mA/0-10V corresponds to 0-100% (2.) (as NOTE 2)
	220DH	Display signal of AVI2 analog input terminal, -10V~10V corresponds to -100~100% (3.) (as NOTE 2)
	220EH	Display the IGBT temperature of drive power module in ^{O}C (c.)
	220FH	Display the temperature of capacitance in ^{O}C (i.)
	2210H	The status of digital input (ON/OFF), refer to Pr.02-10 (as NOTE 3)
	2211H	The status of digital output (ON/OFF), refer to Pr.02-15 (as NOTE 4)
	2212H	Display the multi-step speed that is executing (S)
	2213H	The corresponding CPU pin status of digital input (d.) (as NOTE 3)
	2214H	The corresponding CPU pin status of digital output (O.) (as NOTE 4)
	2215H	Reserved
	2216H	Reserved
	2217H	Reserved
	2218H	Reserved
	2219H	Display times of counter overload (0.)
	221AH	Display GFF in % (G.)
	221BH	Reserved
	221CH	Display PLC register D1043 data (C)
	221DH	Reserved
	221EH	User page displays the value in physical measure
	221FH	Output Value of Pr.00-05

4. Exception response:
The VFD is expected to return a normal response after receiving command messages from the master device. The following depicts the conditions when no normal response is replied to the master device.

The VFD does not receive the messages due to a communication error; thus, the VFD has no response. The master device will eventually process a timeout condition.

The VFD receives the messages without a communication error, but cannot handle them. An exception response will be returned to the master device and an error message “CExx” will be displayed on the keypad of VFD. The xx of “CExx” is a decimal code equal to the exception code that is described below.

In the exception response, the most significant bit of the original command code is set to 1, and an exception code which explains the condition that caused the exception is returned.

For example?

ASCII mode		RTU mode	
STX	':'	Address	01H
Address	'0'	Function	86H
	'1'	Exception code	02H
Function	'8'	CRC CHK Low	C3H
	'6'	CRC CHK High	A1H
Exception code	'0'		
	'2'		
LRC CHK	'7'		
	'7'		
END	CR		
	LF		

The explanation of exception codes:

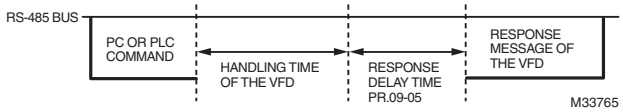
Exception code	Explanation
1	Illegal data value: The data value received in the command message is not available for the VFD.
2	Illegal data address: The data address received in the command message is not available for the VFD.
3	Parameters are locked: parameters can't be changed
4	Parameters can't be changed during operation
10	Communication time-out.

09 - 05 Response Delay Time

Factory Setting: 2.0

Settings 0.0~200.0ms

- This parameter is the response delay time after VFD receives communication command as shown in the following.



09 - 06 Main Frequency of the Communication

Factory Setting: 60.00

Settings 0.00~600.00Hz

- When Pr.00-14 is set to 1 (RS485 communication). The VFD will save the last frequency command into Pr.09-06 when abnormal turn-off or momentary power loss. After reboots the power, it will regards the frequency set in Pr.09-06 if no new frequency command is inputted

09 - 07 Block Transfer 1
09 - 08 Block Transfer 2
09 - 09 Block Transfer 3
09 - 10 Block Transfer 4
09 - 11 Block Transfer 5
09 - 12 Block Transfer 6

- **09 - 13 Block Transfer 7**
- **09 - 14 Block Transfer 8**
- **09 - 15 Block Transfer 9**
- **09 - 16 Block Transfer 10**
- **09 - 17 Block Transfer 11**
- **09 - 18 Block Transfer 12**
- **09 - 19 Block Transfer 13**
- **09 - 20 Block Transfer 14**
- **09 - 21 Block Transfer 15**
- **09 - 22 Block Transfer 16**

Factory Setting: 0

Settings 0~65535

- There is a group of block transfer parameter available in the VFD (Pr.09-07 to Pr.09-16). User can use them (Pr.09-07 to Pr.09-16) to save those parameters that you want to read.

09 - 23 Communication Decoding Method

Factory Setting: 1

Settings 0: by 20XX

1: by 60XX

09 - 24 COM 1 Protocol

Settings 0: RS485 Factory Setting: 0

1: Bacnet

09 - 25 PLC address

Factory Setting: 2

Settings 1~254

09 - 26 CANopen Slave Address

Factory Setting: 0

Settings 0: Disable

1~127

09 - 27 CAN Open Speed

Factory Setting: 0

Settings 0: 1M

1: 500k

2: 250k

3: 125k

4: 100k (Honeywell only)

5: 50k

09 - 28 CANopen Frequency Gain

Factory Setting: 100

Settings 0.00 ~ 200

09 - 29 CANopen Warning Record

Factory Setting: Read Only

Settings bit 0: CANopen Guarding Time out
bit 1: CANopen Heartbeat Time out
bit 2: CANopen SYNC Time out
bit 3: CANopen SDO Time out
bit 4: CANopen SDO buffer overflow
bit 5: Can Bus Off
bit 6: Error protocol of CANOPEN

09 - 30 CANopen Decoding Standard DS402

Factory Setting: 1

Settings 0: Communication definition of CP2000 series
1: CANopen Standard DS402 protocol

09 - 31 CANopen Status

Factory Setting: Read Only

Settings 0: Node Reset State
1: Com Reset State
2: Boot up State
3: Pre Operation State
4: Operation State
5: Stop State

09 - 32 CANopen Control Status

Factory Setting: Read Only

Settings 0: Not ready for use state
1: Inhibit start state
2: Ready to switch on state
3: Switched on state

4: Enable operation state

7: Quick stop active state

13: Err reaction activation state

14: Error state

09 - 33 Reset CANopen Index

Factory Setting: 65535

Settings 0 ~ 65535

09 - 34 Reserved

09 - 35 CANopen Master Function

Factory Setting: 0

Settings 0: Disable

1: Enable

09 - 36 CANopen Master Address

Factory Setting: 100

Settings 1~127

09 – 37 BACnet MAC ID

Factory Setting: 1

Settings 0~127

09 - 38 BACnet Baud Rate

Factory Setting: 384

Settings 96~384 Kbps

09 - 39 BACnet Device ID L

Factory Setting: 1

Settings 0~65535

09 - 40 BACnet Device ID H

Factory Setting: 0

Settings 0~63

09 - 41 BACnet Polling Address

Factory Setting: 127

Settings 0~127

09 - 42 BACnet Password

Factory Setting: 0

Settings 0~65535

09 - 43 Identifications for Communication Card

Factory Setting: Read Only

Settings 0: No Communication Card
1: DeviceNet Slave
2: Profibus-DP Slave
3: CANopen Slave/Master
4: Modbus-TCP Slave
5: EtherNet/IP Slave
6~8: Reserved

09 - 44 Firmware Version of Communication Card

Factory Setting: Read Only

Settings Read Only

09 - 45 Product Code

Factory Setting: Read Only

Settings Read Only

09 - 46 Error Code

Factory Setting: Read Only

Settings Read Only

09 - 47 Address of Communication Card

Factory Setting: Read Only

Settings DeviceNet: 0-63

Profibus-DP: 1-125

09 - 48 Setting of DeviceNet Speed (according to Pr.09-49

Factory Setting: 2

Settings Standard DeviceNet:

0: 100Kbps

1: 125Kbps

2: 250Kbps

3: 1Mbps

Non standard DeviceNet:

0: 10Kbps

1: 20Kbps

2: 50Kbps

3: 100Kbps

4: 125Kbps

5: 250Kbps

6: 500Kbps

7: 800Kbps

8: 1Mbps

09 - 49 Other setting of Device net Speed

Factory Setting: 1

Settings 0: Disable

1: Enable

- This parameter needs to co-work with Pr09-48.
- Setting 0: The baud rate can only be set to 0, 1, 2 or 3.?
- Setting 1: Setting of DeviceNet baud rate can be the same as CANopen (setting 0-8

09 - 50 IP Configuration of the Communication Card

Factory Setting: 0

Settings 0: Static IP

1: Dynamic IP (DHCP)

- Setting 0: it needs to set IP address manually.

- Setting 1: IP address will be auto set by host controller

09 - 51 IP Address 1 of the Communication Card
09 - 52 IP Address 2 of the Communication Card
09 - 53 IP Address 3 of the Communication Card
09 - 54 IP Address 4 of the Communication Card

Factory Setting: 0

Settings 0~255

09 - 55 Address Mask 1 of the Communication Card
09 - 56 Address Mask 2 of the Communication Card
09 - 57 Address Mask 3 of the Communication Card
09 - 58 Address Mask 4 of the Communication Card

Factory Setting: 0

Settings 0~255

09 - 59 Getway Address 1 of the Communication Card
09 - 60 Getway Address 2 of the Communication Card
09 - 61 Getway Address 3 of the Communication Card
09 - 62 Getway Address 4 of the Communication Card

Factory Setting: 0

Settings 0~255

09 - 63 Password for Communication Card (Low word)
09 - 64 Password for Communication Card (High word)

Factory Setting: 0

Settings 0~99

09 - 65 Reset Communication Card

Factory Setting: 0

Settings 0: Disable

1: Reset to the factory setting

09 - 66 Additional Setting for Communication Card

Factory Setting: 1

Settings Bit 0: Enable IP Filter

Bit 1: Internet parameters enable(1bit)
Enable to write internet parameters (1bit). This bit will change to disable when it finishes sAVI1ng the update of internet parameters.

Bit 2: Login password enable(1bit)
Enable login password (1bit). This bit will be changed to disable when it finishes sAVI1ng the update of internet parameters.

09 - 67 Status of Communication Card

Factory Setting: 0

Settings Bit 0: password enable
When the communication card is set with password, this bit is enabled. When the password is clear, this bit is disabled.

10 Pump Parameter ~ The parameter can be set during operation.

10 - 00 Circulative Control

Factory Setting: 0

Settings
0: No operation
1: Fixed Time Circulation (by time)
2: Fixed Quantity
3: Fixed quantity control
4: Fixed **Time** Circulation + Fixed **Quantity** Circulation
5: Fixed Time **Circulation** + Fixed Quantity **Control**

- In this mode, VFD CORE can control up to 8 motors at a time. The total number of the motors can be determined by Pr.10-01. In accordance with the Fixed Time Circulation of Pr10-02, you can adjust the switching time between Start/Stop of each motor. That means when an operating motor reaches the time setting of Pr10-02, VFD CORE will stop that motor. Then after the delay time setting of Pr10-03, next motor will start operating. See diagram below.

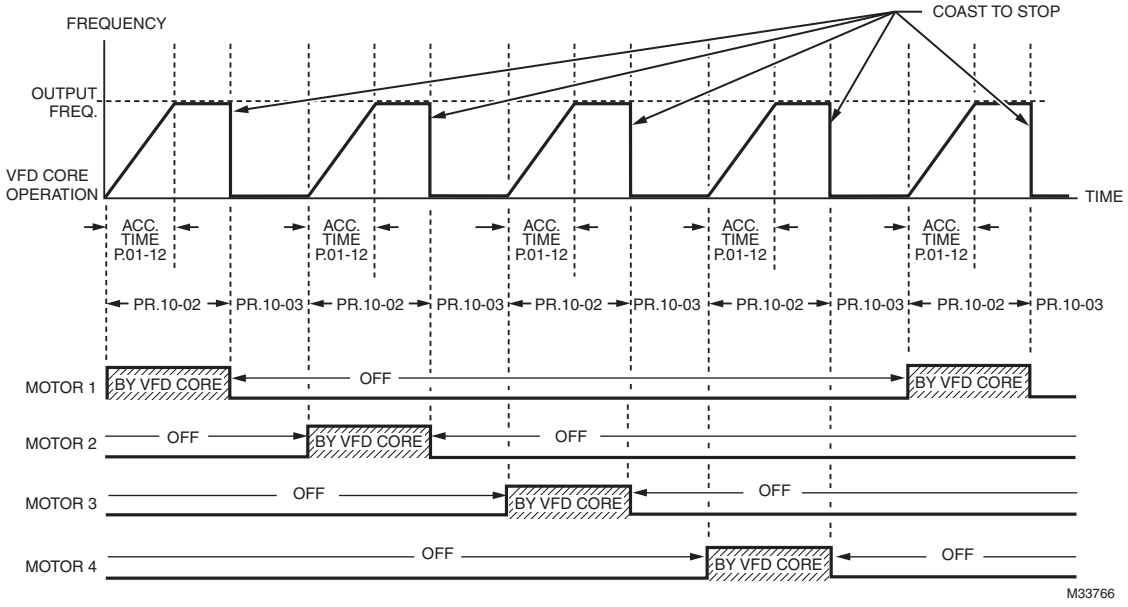


Fig. 2. Sequential Diagram of the Fixed Time Circulation (by time)

- Disable Motors' Output

Set the Multifunction Input Commands as Disable Motors' Output can stop corresponding motors. The settings are:

P02-01~P02-06=	60	61	62	63	64	65	66	67	68
Disable Motors' Output	ALL	1	2	3	4	5	6	7	8

When a motor's output is disabled, this motor will park freely.

Wiring: Fixed Time Circulation (by time) Control can control up to 8 motors. The diagram below is an example of controlling 4 motors at the same time.

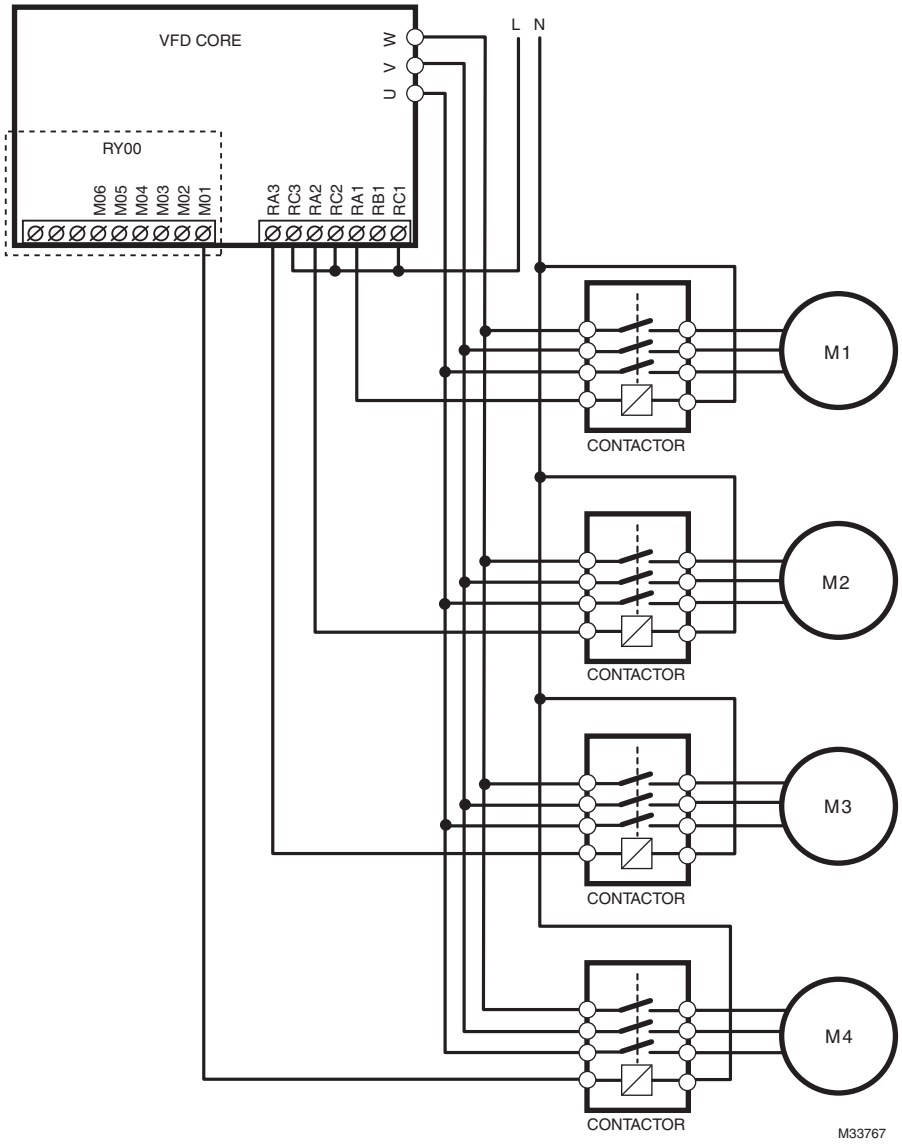


Fig. 3. Controlling 4 motors at the same time.

10 – 01 Number of Motors to be connected

Factory Setting: 1

Settings 1 to 8

- Number of Motors: Maximum 8 motors. After setting number of motor to be connected at the same time, multi-function output terminals will follow automatically the setting as shown in the table below.

Table 5. Setting of Multi-function Output Terminal on Circulating Motors

P10-01	01	02	03	04	05	06	07	08
P02-13	55	55	55	55	55	55	55	55
P02-14		56	56	56	56	56	56	56
P02-15			57	57	57	57	57	57
P02-34				58	58	58	58	58
P02-35					59	59	59	59
P02-36						60	60	60
P02-37							61	61
P02-38								62

10 - 02 Operating time of each motor (minutes)

Factory Setting: 0

Settings 0 to 65500 minutes

- Setting of Fixed Time Circulation by minute. If Pr10-02 = 0, that means stop timing, the current running motors will keep on operating until a stop command is given.

10 - 03 Delay Time due to the Acceleration (or the Increment) at Motor Switching (seconds)

Factory Setting: 1.0

Settings 0.0 to 3600.0 seconds

- Delay time when switching motors in seconds. When the current running motors reach the time setting of Pr10-02, VFD CORE will follow the delay time setting of Pr10-03 and then switch to run the next motors.

10 - 04 Delay Time due to the Deceleration (or the Decrement) at Motor Switching (seconds)

Factory Setting: 1.0

Settings 0.0 to 3600.0 seconds

10 - 05 Delay time while fixed quantity circulation at Motor Switching (seconds)

Factory Setting: 10.0

Settings 0.0 to 3600.0 seconds

Fixed quantity circulation with PID

Sequential Diagram
In this mode, VFD CORE can control up to 4 motors to increase controlling flow quantity and pressure range. When controlling flow quantity, motors will be in parallel connection. When controlling pressure range, motors will be in series connection

If need to increase flow quantity or pressure range, VFD CORE will increase first motor's pressure from 0Hz to the largest operating frequency. If output frequency reaches the frequency setting of Pr10-06 and delay time of Pr10-05, then VFD CORE will delay the time setting of Pr10-03. Then VFD CORE will switch the motor to use mains electricity and delay the time setting of Pr10-03 to run next motor. If necessary, other motors will be activated in sequence. See sequential diagrams in Fig. 4 & 5.

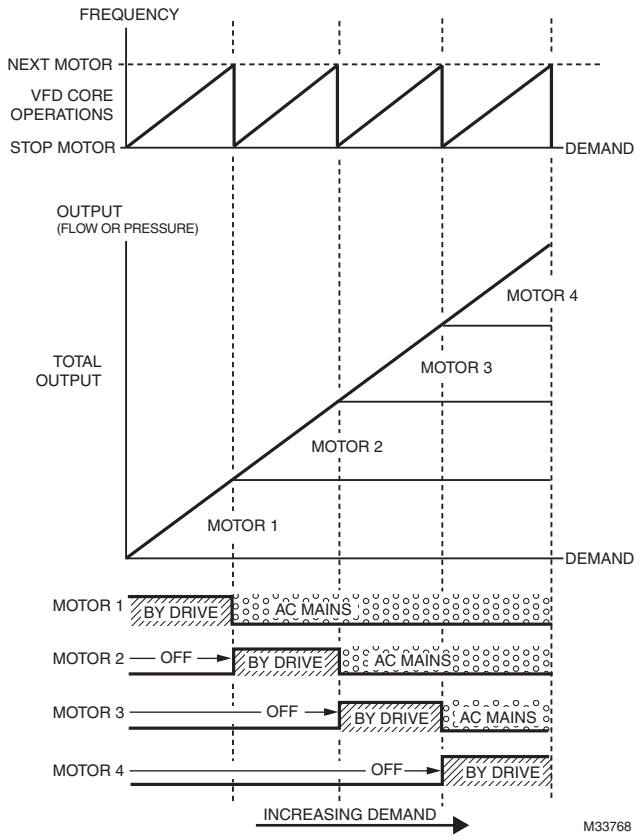


Fig. 4. Sequence of Fixed quantity circulation with PID – Increasing Demand

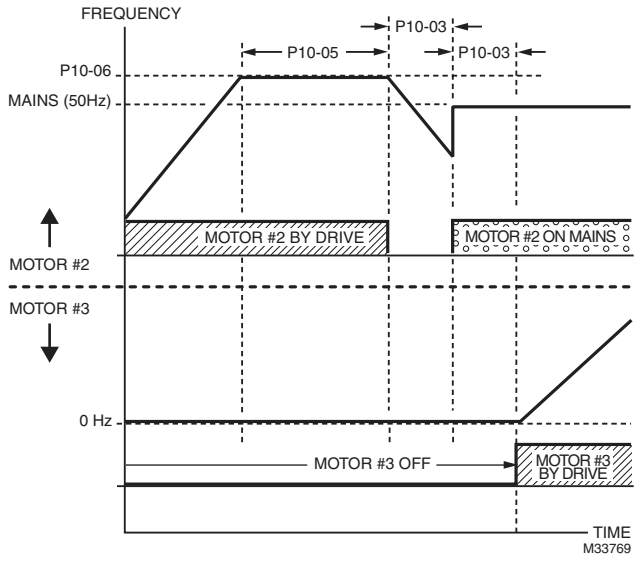


Fig. 5. Sequence of switching motors at fixed quantity circulation with PID – increasing demands.

However if decreasing demands when flow quantity and pressure are too big, VFD CORE will stop the current operating motors and wait for the delay time setting of Pr10-04. Then keep on doing this until the last motor stop using mains electricity. See sequential diagrams in Fig. 6 & 7 below.

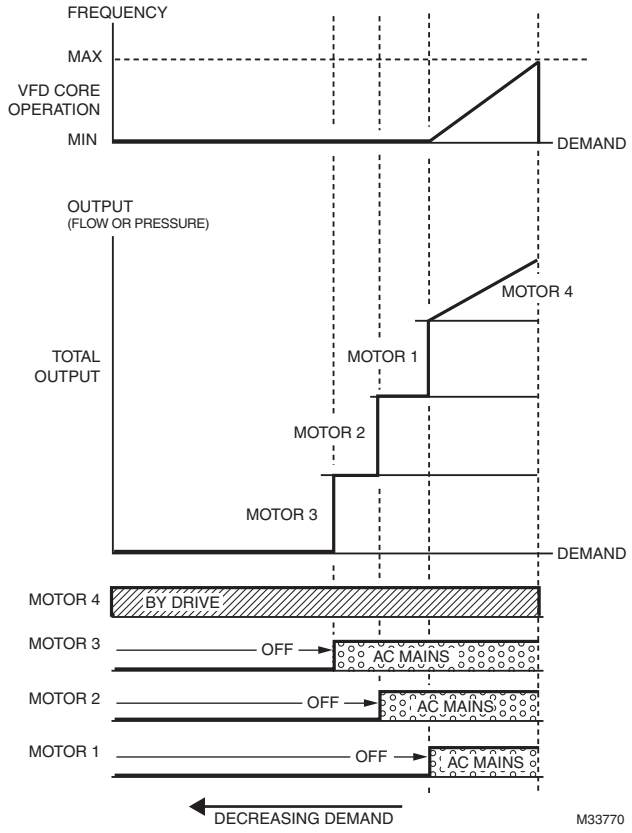


Fig. 6. Sequence of switching motors at fixed quantity circulation with PID – decreasing demands.

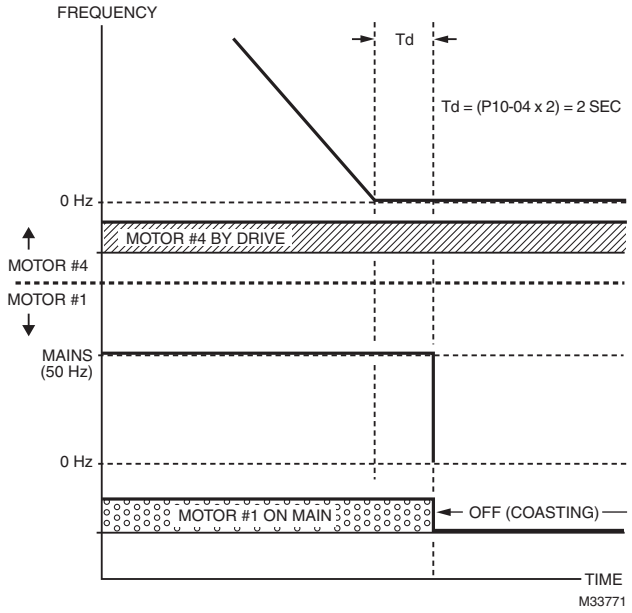


Fig. 7. Sequence of switching motors at fixed quantity circulation with PID – decreasing demands

Parameter Setting

<table>
<tr><td>Parameter setting</td><td>Description</td></tr>
<tr><td>P10-00=2</td><td>Choose Fixed quantity circulation with PID</td></tr>
<tr><td>P10-01=X</td><td>Number of Motors: Maximum 4 motors. After setting number of motor to be connected at the same time, multi-function output terminals will follow automatically the setting as shown in the table below.
<table>
<tr><td>P10-01</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td></td></tr>
<tr><td>P02-13</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>Motor #1 by Mains</td></tr>
<tr><td>P02-14</td><td></td><td>56</td><td>546</td><td>56</td><td>56</td><td>56</td><td>56</td><td>56</td><td>Motor #2 by Mains</td></tr>
<tr><td>P02-15</td><td></td><td></td><td>57</td><td>57</td><td>57</td><td>57</td><td>57</td><td>57</td><td>Motor #3 by Mains</td></tr>
<tr><td>P02-34</td><td></td><td></td><td></td><td>58</td><td>58</td><td>58</td><td>58</td><td>58</td><td>Motor #4 by Mains</td></tr>
<tr><td>P02-35</td><td></td><td></td><td></td><td></td><td>59</td><td>59</td><td>59</td><td>59</td><td>Motor #5 by Mains</td></tr>
<tr><td>P02-36</td><td></td><td></td><td></td><td></td><td></td><td>60</td><td>60</td><td>60</td><td>Motor #6 by Mains</td></tr>
<tr><td>P02-37</td><td></td><td></td><td></td><td></td><td></td><td></td><td>61</td><td>61</td><td>Motor #7 by Mains</td></tr>
<tr><td>P02-38</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>62</td><td>Motor #8 by Mains</td></tr>
</table>
Table 2: Setting of Multi-function Output Terminal on Circulating Motors</td></tr>
<tr><td>P10-03=X</td><td>Delay Time due to the Acceleration (or the Increment) at Motor Switching (unit: second)</td></tr>
<tr><td>P10-04=X</td><td>Delay Time due to the Deceleration (or the Decrement) at Motor Switching (unit: sec)</td></tr>
<tr><td>P10-05=X</td><td>Delay time while fixed quantity circulation at Motor Switching with PID (unit: seconds)</td></tr>
<tr><td>P10-06=X</td><td>Frequency when switching motors at fixed quantity circulation (Hz)</td></tr>
</table>

Disable Motor Output

Set the Multifunction Input Commands as Disable Motors' Output can stop corresponding motors. The settings are:

P02-01~P02-06=	60	61	62	63	64	65	66	67	68
Disable Motor Output	ALL	1	2	3	4	5	6	7	8

When a motor's output is disabled, this motor will park freely.

Fixed quantity circulation with PID can control up to 4 motors.

The diagram below is an example of controlling 4 motors.

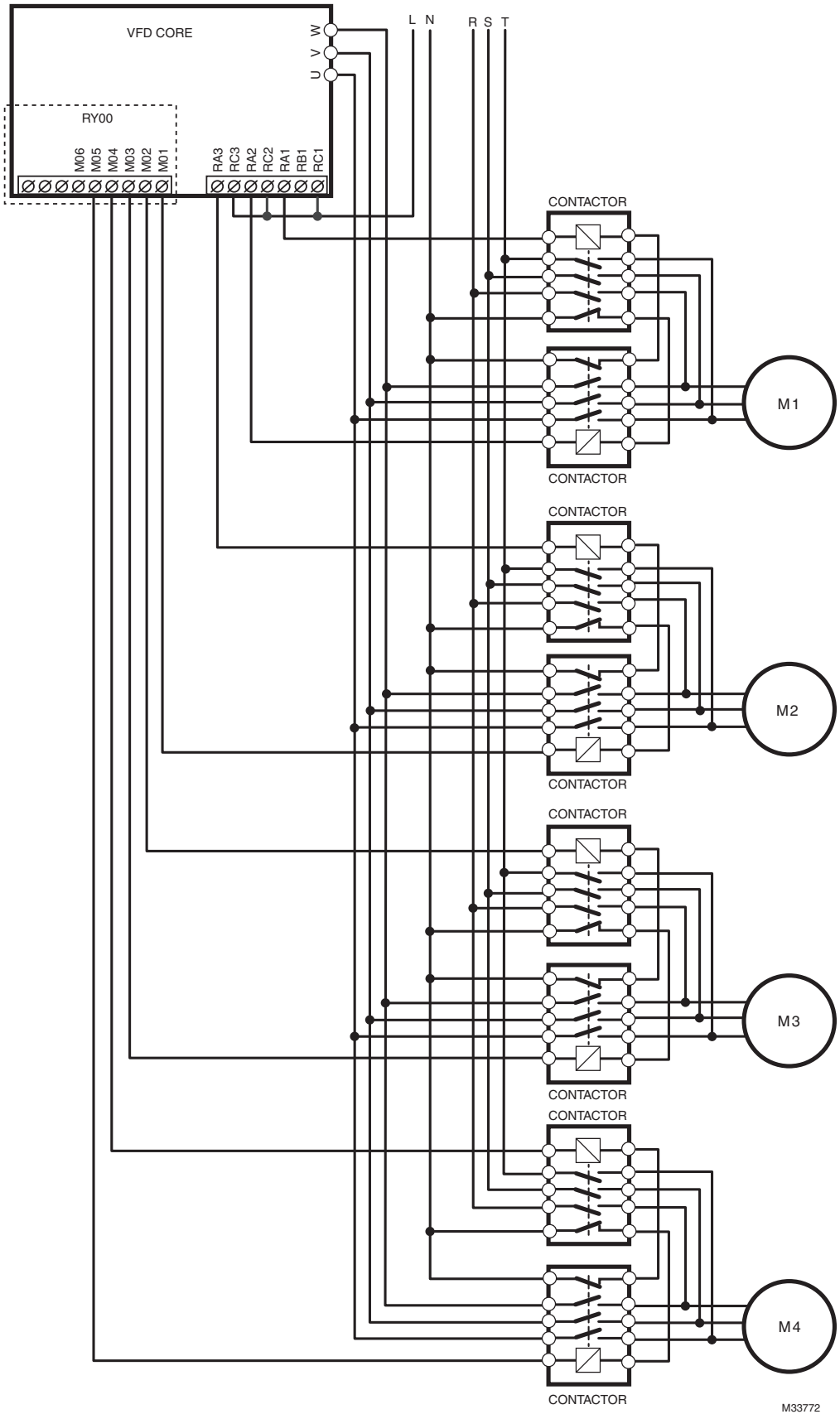


Fig. 8. Fixed quantity circulation with PID controlling 4 motors.

10 - 06 Frequency when switching motors at fixed quantity circulation (Hz)

Factory Setting: 60.00

Settings 0.0 to 600.00 hz

When the drive's output frequency reaches the setting value of Pr10-06, the system will start preparing to switch motors.

10 - 07 Action to do when Fixed Quantity Circulation breaks down

Factory Setting: 0

Settings 0: Turn off all output
1: Motors powered by mains electricity continues to operate

10 - 08 Frequency when stopping auxiliary motor (Hz)

Factory Setting: 0

Settings 0.00 to 600.00 hz

When the output frequency is smaller than the setting value of Pr10-08 and remains at the time set ii ng of Pr10-04, motors will be shut down one by one.

Fixed quantity control with PID

In this mode, VFD CORE can control up to 8 motors to increase controlling flow quantity and pressure range.

VFD CORE connects directly to a main motor while the rest of motors are using mains electricity and controlled by a relay. When controlling flow quantity, motors will be in parallel connection. When controlling pressure range, motors will be in series connection

If need to increase flow quantity or pressure range, VFD CORE will increase the main motor's pressure from 0Hz to the largest operating frequency. If necessary, VFD CORE will switch in sequence the motors to use mains electricity. See two sequential diagrams below.

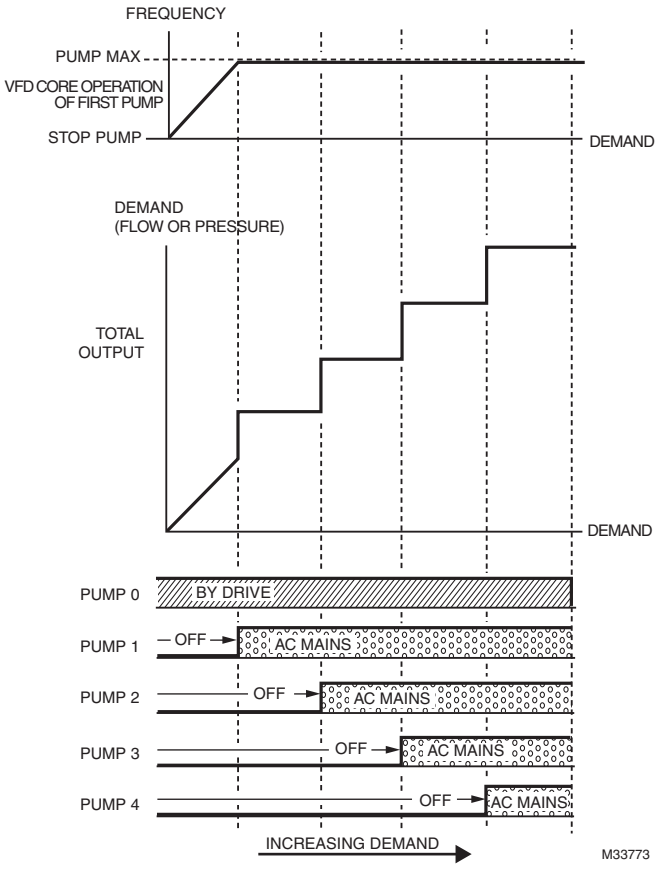


Fig. 9. Fixed quantity control with PID – Increasing Demand

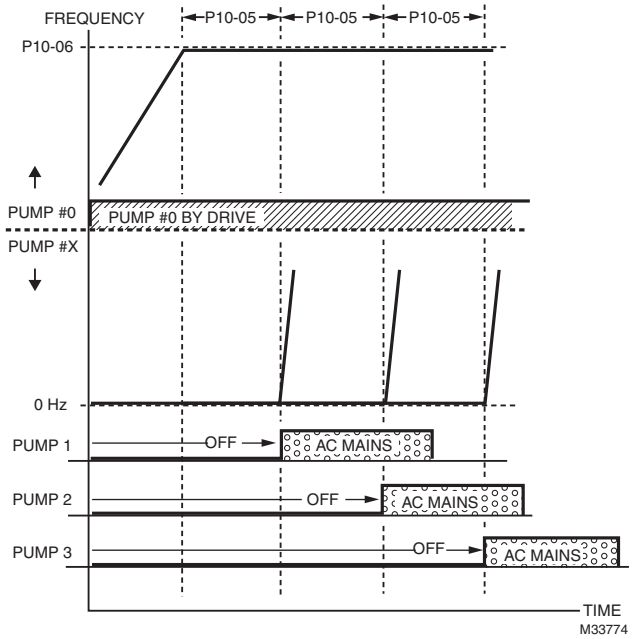


Fig. 10. Sequence of switching motors at fixed quantity control with PID – increasing demand.

However, if the flow quantity or pressure is too big, VFD CORE will stop, one by one, the motors from using mains electricity until VFD CORE decrease the main motor's frequency to 0Hz.

See next two figures.

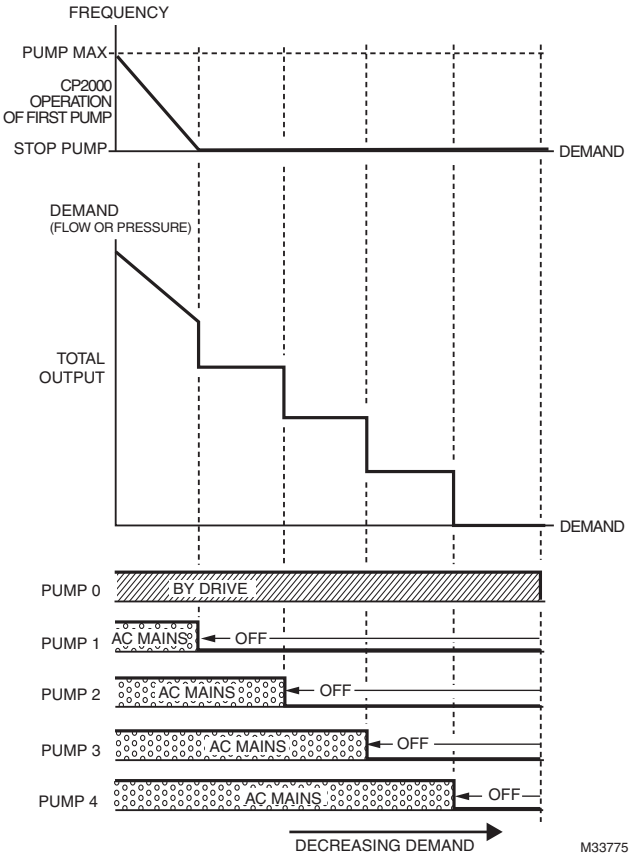


Fig. 11. Sequence of switching motors at fixed quantity control with PID – decreasing demand.

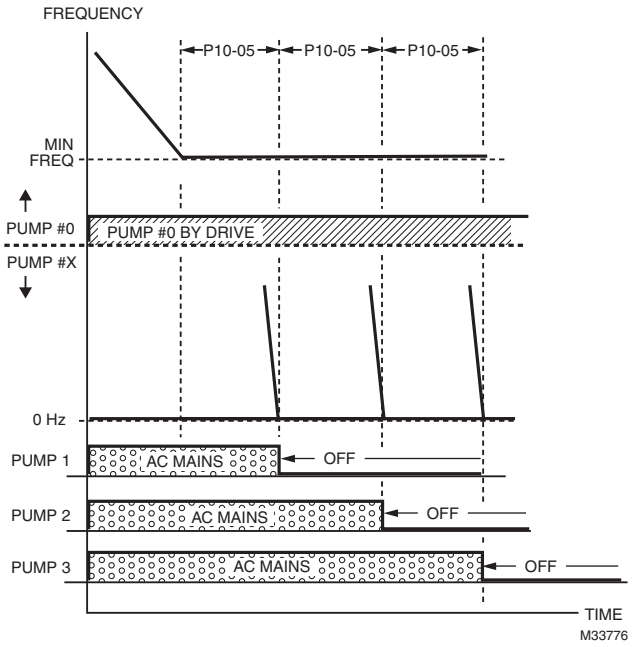


Fig. 12. Sequence of switching motors at fixed quantity control with PID – decreasing demand.

<table>
<tr><td>Parameter setting</td><td>Description</td></tr>
<tr><td>P10-00=3</td><td>Choose Fixed quantity control</td></tr>
<tr><td>P10-01=X</td><td>Number of Motors: Maximum 8 motors. After setting number of motors to be connected at the same time, multi-function output terminals will follow automatically the setting as shown in the table below.
<table>
<tr><td>P10-01</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td><td>08</td><td></td></tr>
<tr><td>P02-13</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>55</td><td>Motor #1 by Mains</td></tr>
<tr><td>P02-14</td><td></td><td>56</td><td>546</td><td>56</td><td>56</td><td>56</td><td>56</td><td>56</td><td>Motor #2 by Mains</td></tr>
<tr><td>P02-15</td><td></td><td></td><td>57</td><td>57</td><td>57</td><td>57</td><td>57</td><td>57</td><td>Motor #3 by Mains</td></tr>
<tr><td>P02-34</td><td></td><td></td><td></td><td>58</td><td>58</td><td>58</td><td>58</td><td>58</td><td>Motor #4 by Mains</td></tr>
<tr><td>P02-35</td><td></td><td></td><td></td><td></td><td>59</td><td>59</td><td>59</td><td>59</td><td>Motor #5 by Mains</td></tr>
<tr><td>P02-36</td><td></td><td></td><td></td><td></td><td></td><td>60</td><td>60</td><td>60</td><td>Motor #6 by Mains</td></tr>
<tr><td>P02-37</td><td></td><td></td><td></td><td></td><td></td><td></td><td>61</td><td>61</td><td>Motor #7 by Mains</td></tr>
<tr><td>P02-38</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>62</td><td>Motor #8 by Mains</td></tr>
</table>
Table 2: Setting of Multi-function Output Terminal on Circulating Motors</td></tr>
<tr><td>P10-05=X</td><td>Delay time while fixed quantity circulation at Motor Switching (unit: seconds)</td></tr>
<tr><td>P10-06=X</td><td>Frequency when switching motors at fixed quantity circulation (Hz)</td></tr>
</table>

Disable Motor's Output

Set the Multifunction Input Commands as Disable Motors' Output can stop corresponding motors.

The settings are:

P02-01~P02-06=	60	61	62	63	64	65	66	67	68
Disable Motor's Output	ALL	1	2	3	4	5	6	7	8

When a motor's output is disabled, this motor will park freely

Wiring

Fixed Quantity Control can control up to 8 motors. The following is an example of controlling 4 motors at the same time.

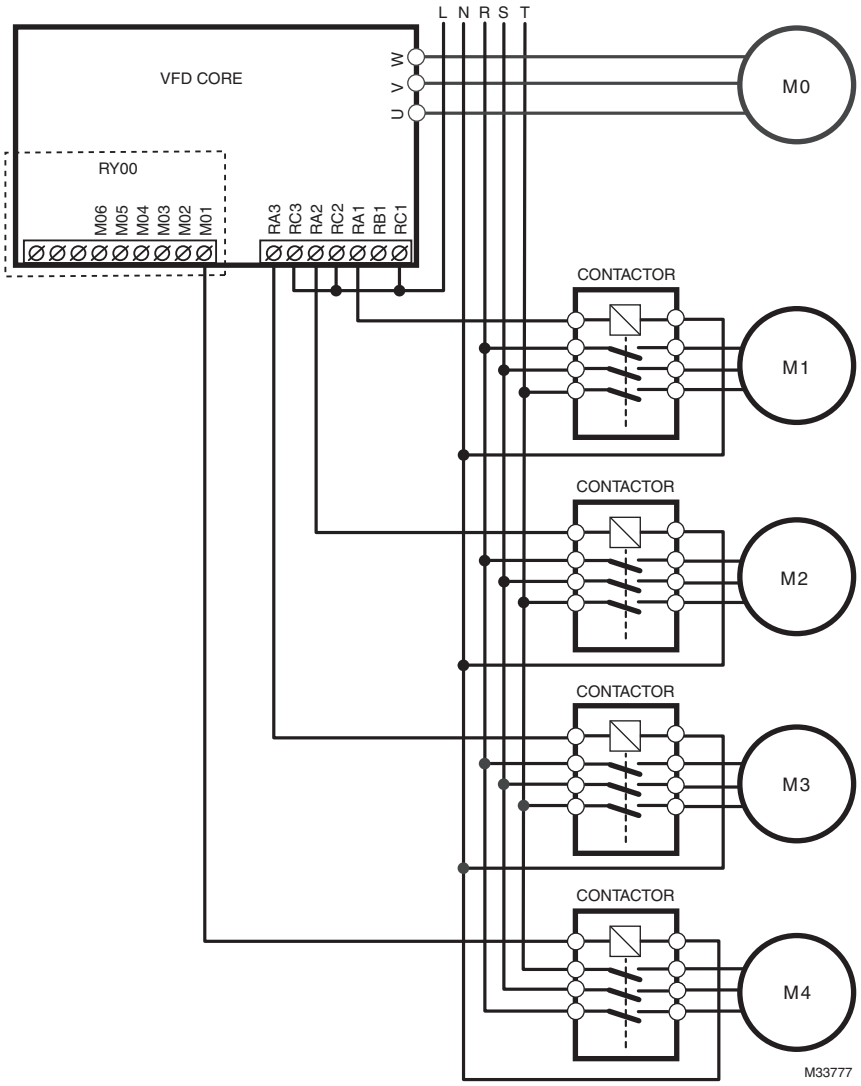


Fig. 13. Controlling 4 motors at the same time.

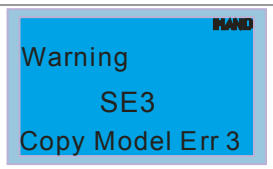
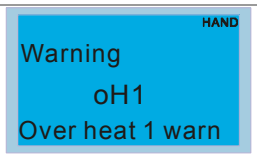
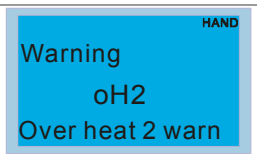
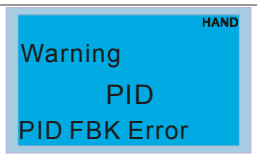
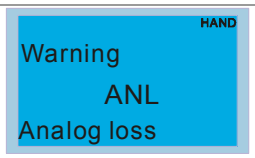
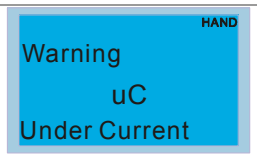
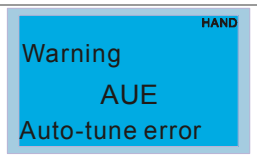
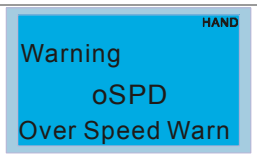
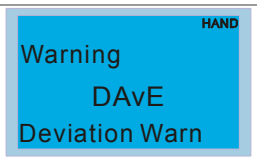
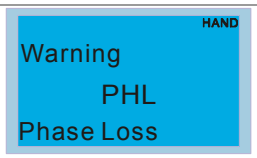
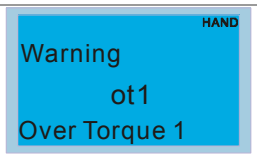
Time circulation and Fixed quantity circulation with PID

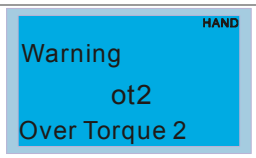
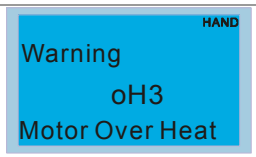
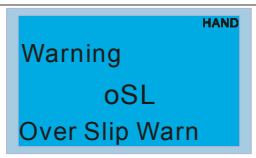
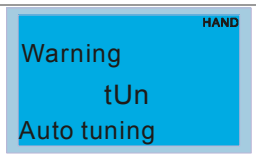
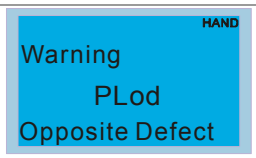
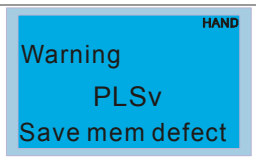
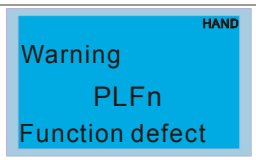
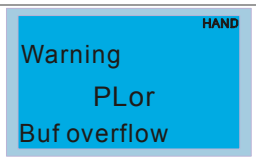
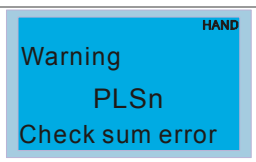
This mode combines **Time circulation and Fixed quantity circulation with PID**. It is to prevent motors to become rusty if they are not in use for a long period of time. If some motors are not activated, set the fixed time circulation to run motors one by one to make sure each of them has the chance to run.

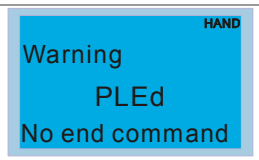
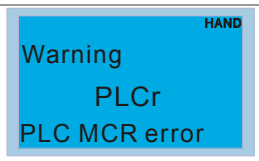
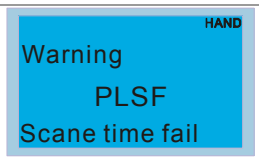
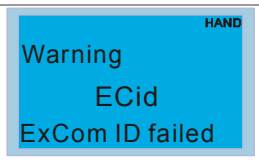
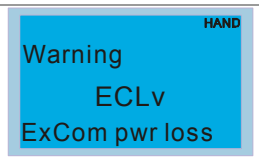
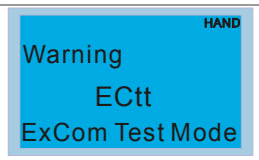
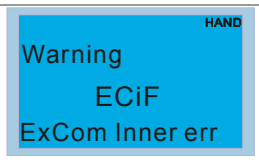
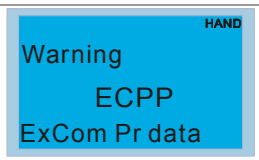
CHAPTER 13: WARNING CODES

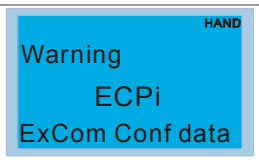
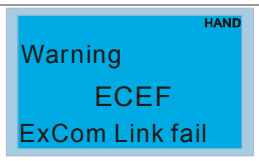
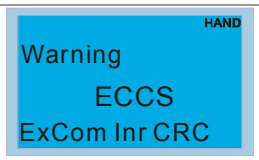
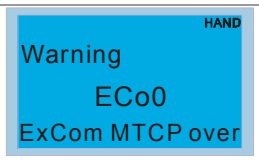
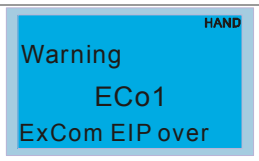
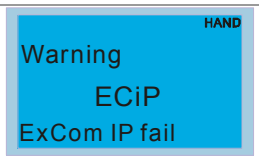
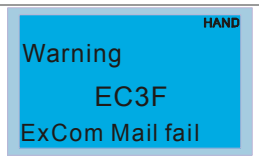
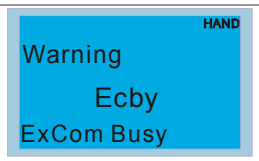
❶ Display error signal
❷ Abbreviated error code
❸ Display error description

Display on LCM Keypad	Descriptions
HAND Warning CE01 Comm. Error 1	Modbus function code error
HAND Warning CE02 Comm. Error 2	Address of Modbus data is error
HAND Warning CE03 Comm. Error 3	Modbus data error
HAND Warning CE04 Comm. Error 4	Modbus communication error
HAND Warning CE10 Comm. Error 10	Modbus transmission time-out
HAND Warning CP10 Keypad time out	Keypad transmission time-out
HAND Warning SE1 Save Error 1	Keypad COPY error 1
HAND Warning SE2 Save Error 2	Keypad COPY error 2

	Keypad COPY error 3
	IGBT over-heating warning
	Capacity over-heating warning
	PID feedback error
	ACI signal error When Pr03-19 is set to 1 and 2.
	Low current
	Auto tuning error
	Over-speed warning
	Over speed deviation warning
	Phase loss
	Over torque 1

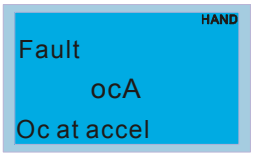
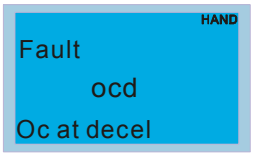
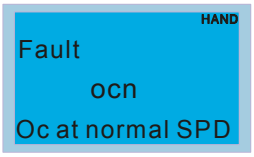
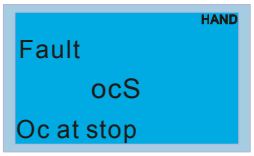
	Over torque 2
	Motor over-heating
	Over slip
	Auto tuning processing
	PLC download error
	Save error of PLC download
	Data error during PLC operation
	Function code of PLC download error
	PLC register overflow
	Function code of PLC operation error
	PLC checksum error

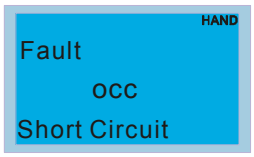
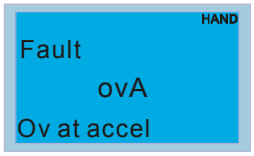
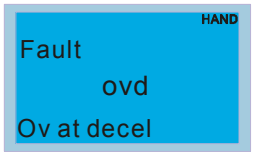
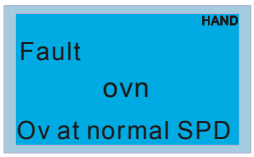
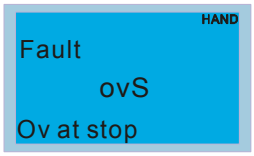
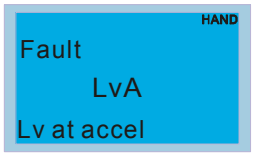
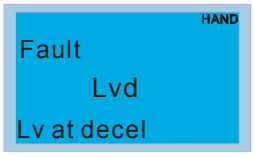
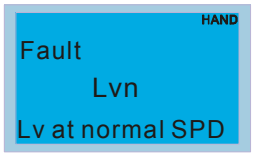
	PLC end command is missing
	PLC MCR command error
	PLC download fail
	PLC scan time exceed
	Duplicate MAC ID error Node address setting error
	Low voltage of communication card
	Communication card in test mode
	Factory default setting error
	Serious internal error
	IO connection break off
	Profibus parameter data error

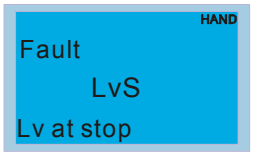
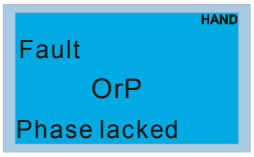
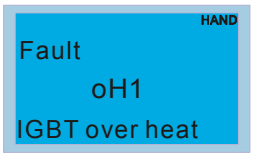
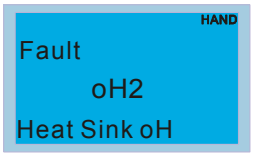
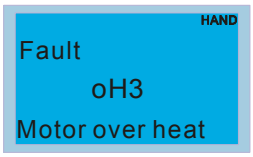
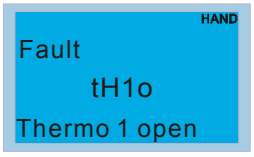
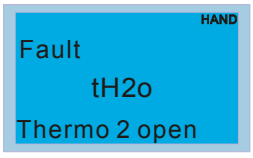
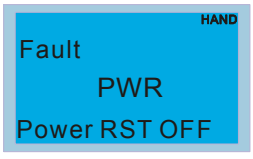
	Profibus configuration data error
	Ethernet Link fail
	Communication time-out for communication card and drive
	Check sum error for Communication card and drive
	Communication card returns to default setting
	Modbus TCP exceed maximum communication value
	EtherNet/IP exceed maximum communication value
	IP fail
	Mail fail
	Communication card busy

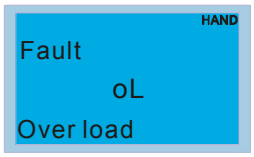
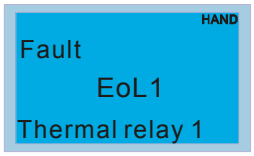
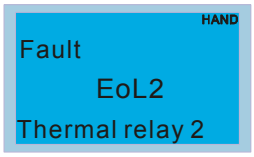
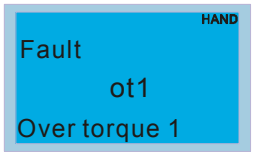
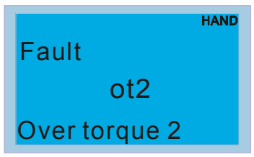
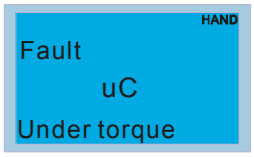
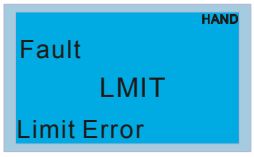
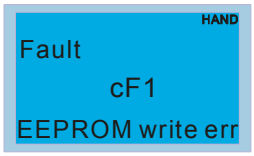
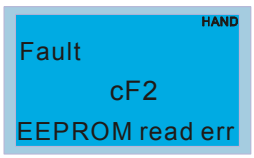
CHAPTER 14: FAULT CODES AND DESCRIPTIONS

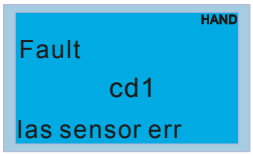
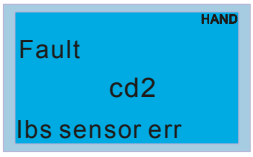
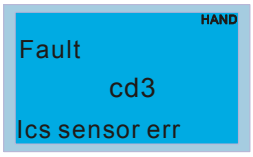
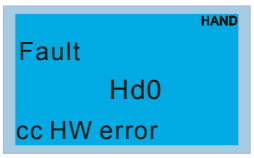
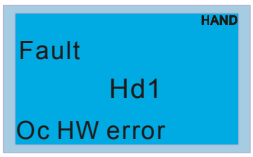
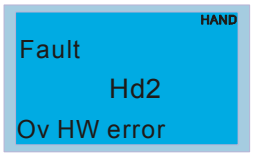
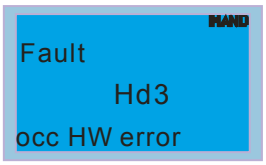
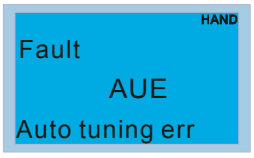
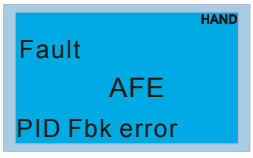
❶ Display error signal
❷ Abbreviated error code
❸ Display error description

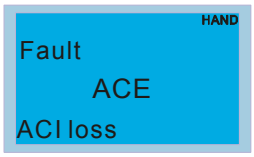
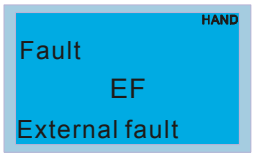
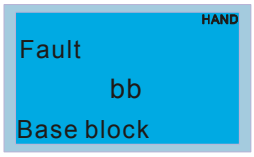
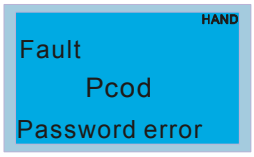
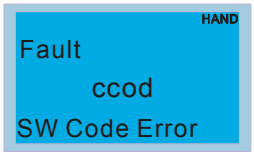
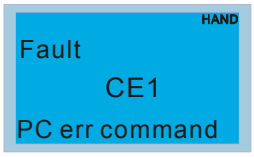
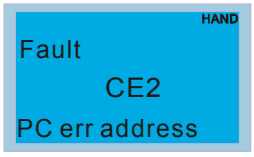
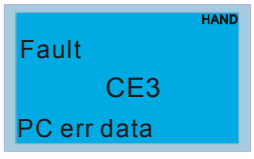
Fault Name	Fault Descriptions	Corrective Actions
	Over-current during acceleration (Output current exceeds triple rated current during acceleration.)	1. Short-circuit at motor output: Check for possible poor insulation at the output. 2. Acceleration Time too short: Increase the Acceleration Time. 3. VFD output power is too small: Replace the VFD with the next higher power model.
	Over-current during deceleration (Output current exceeds triple rated current during deceleration.)	1. Short-circuit at motor output: Check for possible poor insulation at the output. 2. Deceleration Time too short: Increase the Deceleration Time. 3. VFD output power is too small: Replace the VFD with the next higher power model.
	Over-current during steady state operation (Output current exceeds triple rated current during constant speed.)	1. Short-circuit at motor output: Check for possible poor insulation at the output. 2. Sudden increase in motor loading: Check for possible motor stall. 3. VFD output power is too small: Replace the VFD with the next higher power model.
	Hardware failure in current detection	Return to the factory
	Ground fault	When (one of) the output terminal(s) is grounded, short circuit current is more than 50% of VFD rated current, the VFD power module may be damaged. NOTE: The short circuit protection is provided for VFD protection, not for protecting the user. 1. Check the wiring connections between the VFD and motor for possible short circuits, also to ground. 2. Check whether the IGBT power module is damaged. 3. Check for possible poor insulation at the output.

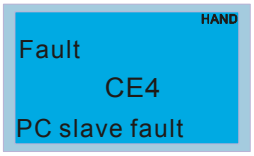
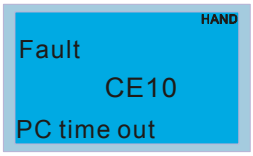
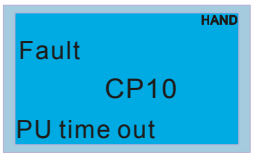
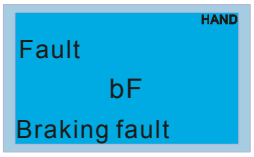
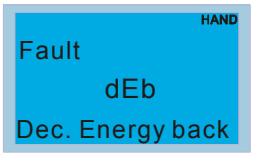
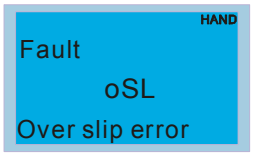
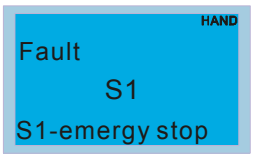
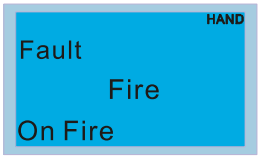
	Short-circuit is detected between upper bridge and lower bridge of the IGBT module	Return to the factory
	DC BUS over-voltage during acceleration (230V: DC 450V; 460V: DC 900V)	1. Check if the input voltage falls within the rated VFD input voltage range. 2. Check for possible voltage transients. 3. If DC BUS over-voltage due to regenerative voltage, please increase the Deceleration Time or add an optional brake resistor.
	DC BUS over-voltage during deceleration (230V: DC 450V; 460V: DC 900V)	1. Check if the input voltage falls within the rated VFD input voltage range. 2. Check for possible voltage transients. 3. If DC BUS over-voltage due to regenerative voltage, please increase the Deceleration Time or add an optional brake resistor.
	DC BUS over-voltage at constant speed (230V: DC 450V; 460V: DC 900V)	1. Check if the input voltage falls within the rated VFD input voltage range. 2. Check for possible voltage transients. 3. If DC BUS over-voltage due to regenerative voltage, please increase the Deceleration Time or add an optional brake resistor.
	Hardware failure in voltage detection	1. Check if the input voltage falls within the rated VFD input voltage range. 2. Check for possible voltage transients.
	DC BUS voltage is less than Pr.06-00 during acceleration	1. Check if the input voltage is normal 2. Check for possible sudden load
	DC BUS voltage is less than Pr.06-00 during deceleration	1. Check if the input voltage is normal 2. Check for possible sudden load
	DC BUS voltage is less than Pr.06-00 in constant speed	1. Check if the input voltage is normal 2. Check for possible sudden load

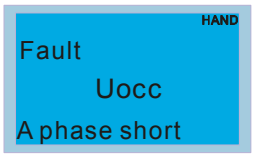
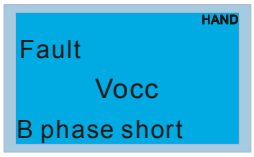
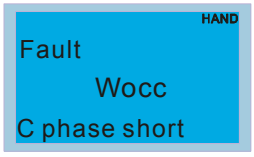
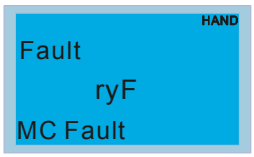
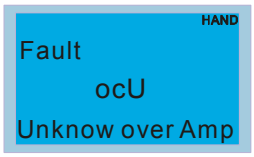
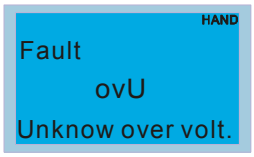
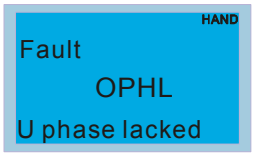
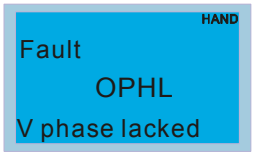
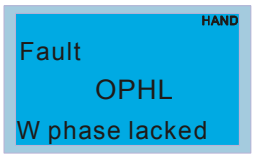
	DC BUS voltage is less than Pr.06-00 at stop	1. Check if the input voltage is normal 2. Check for possible sudden load
	Phase Loss	Check Power Source Input if all 3 input phases are connected without loose contacts. For models 40hp and above, please check if the fuse for the AC input circuit is blown.
	IGBT overheating IGBT temperature exceeds protection level 1 to15HP: 90 °C 20 to 100HP: 100 °C	1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects from the heatsinks and check for possible dirty heat sink fins. 4. Check the fan and clean it. 5. Provide enough spacing for adequate ventilation.
	Heatsink overheating Capacitance temperature exceeds 90°C cause heatsink overheating.	1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure heat sink is not obstructed. Check if the fan is operating 3. Check if there is enough ventilation clearance for VFD.
	Motor overheating The VFD detects that the internal temperature exceeds Pr.06-30 (PTC level)	1. Make sure that the motor is not obstructed. 2. Ensure that the ambient temperature falls within the specified temperature range. 3. Take the next higher power VFD model.
	IGBT Hardware Error	Return to the factory
	Capacitor Hardware Error	Return to the factory
	Power off	

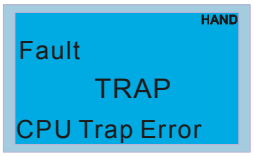
	Overload The VFD detects excessive drive output current.	1. Check if the motor is overloaded. 2. Take the next higher power VFD model.
	Electronics thermal relay 1 protection	1. Check the setting of electronics thermal relay (Pr.06-14) Take the next higher power VFD model
	Electronics thermal relay 2 protection	1. Check the setting of electronics thermal relay (Pr.06-28) 2. Take the next higher power VFD model
 	These two fault codes will be displayed when output current exceeds the over-torque detection level (Pr.06-07 or Pr.06-10) and exceeds over-torque detection (Pr.06-08 or Pr.06-11) and it is set to 2 or 4 in Pr.06-06 or Pr.06-09.	1. Check whether the motor is overloaded. 2. Check whether motor rated current setting (Pr.05-01) is suitable 3. Take the next higher power VFD model.
	Low current detection	Check Pr.06-71, Pr.06-72, Pr.06-73.
	Limit error	
	Internal EEPROM can not be programmed.	1. Press “RESET” key to the factory setting 2. Return to the factory.
	Internal EEPROM can not be read.	1. Press “RESET” key to the factory setting 2. Return to the factory.

	U-phase error	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	V-phase error	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	W-phase error	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	CC (current clamp)	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	OC hardware error	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	OV hardware error	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	Occ hardware error	Reboots the power. If fault code is still displayed on the keypad please return to the factory
	Auto tuning error	1. Check cabling between drive and motor 2. Try again.
	PID loss (ACI)	1. Check the wiring of the PID feedback 2. Check the PID parameters settings

	ACI loss	1. Check the ACI wiring 2. Check if the ACI signal is less than 4mA
	External Fault	1. Input EF (N.O.) on external terminal is closed to GND. Output U, V, W will be turned off. 2. Give RESET command after fault has been cleared.
	Emergency stop	1. When the multi-function input terminals MI1 to MI6 are set to emergency stop, the VFD stops output U, V, W and the motor coasts to stop. 2. Press RESET after fault has been cleared.
	External Base Block	1. When the external input terminal (B.B) is active, the VFD output will be turned off. 2. Deactivate the external input terminal (B.B) to operate the VFD again.
	Password is locked.	Keypad will be locked. Turn the power ON after power OFF to re-enter the correct password. See Pr.00-07 and 00-08.
	Software code error	
	Illegal function code	Check if the function code is correct (function code must be 03, 06, 10, 63)
	Illegal data address (00H to 254H)	Check if the communication address is correct
	Illegal data value	Check if the data value exceeds max./min. value

	Data is written to read-only address	Check if the communication address is correct
	Modbus transmission time-out	
	Keypad transmission time-out	
	Brake resistor fault	If the fault code is still displayed on the keypad after pressing “RESET” key, please return to the factory.
	Y-connection/?-connection switch error	1. Check the wiring of the Y-connection/?-connection 2. Check the parameters settings
	When Pr.07-13 is not set to 0 and momentary power off or power cut, it will display dEb during accel./decel. stop.	1. Set Pr.07-13 to 0 2. Check if input power is stable
	It will be displayed when slip exceeds Pr.05-26 setting and time exceeds Pr.05-27 setting.	1. Check if motor parameter is correct (please decrease the load if overload 2. Check the settings of Pr.05-26 and Pr.05-27
	Emergency stop for external safety	
	Fire Mode	

	Phase A short circuit
	Phase B short circuit
	Phase C short circuit
	The electromagnet switch of the power board is not sealed. (For larger power model: Frame E and above)
	Unknown over current
	Unknown over voltage
	Output phase loss (Phase U)
	Output phase loss (Phase V)
	Output phase loss (Phase W)

	CPU trap error

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